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AN INTERPRETIVE PLAN FOR THE HISTORIC CANYON CREEK CHARCOAL KILNS

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Clemson Class of 1988

June 1989-Final Copy

This paper was prepared as a student project in partial fulfillment of the requirements of the Professional Development for Outdoor Recreation Management Program at Clemson University. It in no way reflects USDA Forest Service policy nor are the opinions expressed those of anyone other than the author.

ABSTRACT

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Title: An Interpretive Plan for the Historic Canyon Creek Charcoal Kilns

Abstract: This project was selected for three major reasons. A highly significant cultural heritage property needed immediate management attention. A group of local citizens were very interested in seeing that the Forest Service took positive steps to insure the preservation of this cultural resource. Local concern had focused Congressional attention on sound management of the site. Finally, the project offered an opportunity to demonstrate how appropriately selected cultural resources could expand recreational opportunities, while preserving and enhancing the cultural values associated with the site.

The Canyon Creek Charcoal Kilns are important reminders of Montana's colorful frontier mining history. The twenty-three beehive-shaped brick kilns were constructed in the early 1880's. They functioned to reduce cordwood to charcoal. The charcoal was an important fuel used to fire the blast furnaces at Glendale, Montana, four miles from the kilns. Glendale, now a ghost town, was once a booming mining town in the Hecla Mining District-one of the most important silver-lead mining areas in Montana. The locally available charcoal fuel was a critical element that contributed to the economic viability of a mining district which produced $22,000,000 in silver and lead between 1873 and 1900.

Past management of the kilns has included construction of a buck-and-pole fence around the site, and the erection of a small interpretive sign adjacent to the road in front of the kilns. The sign is poorly worded, and partly erroneous. Only ten of the kilns are still intact. All are badly in need of stabilization measures to preserve what remains of their physical integrity. The kilns also represent an outstanding opportunity to interpret a portion of Montana's Territorial mining history. This paper consists of three separate, but related, documents. The Cultural Resource Inventory and Evalua-

tion Report records the historic site, develops historical context which indicates its use and importance, evaluates its significance, and recommends appropriate management action to the District Ranger. The Cultural Site Record details information which goes into a Statewide Archeological Database. The Interpretive Plan sets out goals and objectives for creating an interpretive opportunity for visitors to experience, understand, and appreciate, Montana's colorful past.

KEYWORDS: Cultural Resource Management, Interpretation, Western Mining History

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INTERPRETIVE PLANNING PROJECT GUIDE

CANYON CREEK CHARCOAL KILNS-WISE RIVER RANGER DISTRICT

Project Name: Canyon Creek Charcoal Kilns Historic Site Interpretation

Date: 7 February 1989

I. Overview of Themes and Objectives

A. Interpretive Themes

1. The mining frontier as an urban, and industrial frontier. Precious metal mining played a role in the settlement of southwestern Montana that was very different from the frontier settlement pattern of ranchers, homesteaders, or loggers.

2. Precious metal mining is an example of the 19th century philosophy of "Manifest Destiny," which allowed corporations outside of Montana Territory to develop and exploit the area's natural resources without constraint, being accountable to no government entity for their methods, or the effects of those methods.

3. The metal mining industry was dependent upon, and influenced by, its environment.

4. The Nation's cultural heritage properties are a fragile, non-renewable, resource-it is important that we manage them with care and concern.

B. Objectives of the Interpretive Program

1. At least 75% of the visitors will be able to describe the relationship between the Kilns, the smelter at Glendale, and the mines on Lion Mountain.

2. At least 75% of the visitors will be able to describe how charcoal was produced at the Canyon Creek Kilns.

3. At least 75% of the visitors will be able to say why charcoal was produced as a smelter fuel.

4. At least 75% of the visitors will be able to trace on a map the area from which fuelwood was cut to feed the kilns over a twenty year period. They will

also be able to say how many cords of wood were cut to feed the Kilns in a single year.

5. At least 75% of the visitors will come to appreciate how much timber regrowth has occurred in an area that was once denuded of most standing timber.

6. At least 90% of the visitors will be able to say why the preservation and sound management of significant cultural heritage properties is worthwhile.

C. Audience-visitor profile.

We have virtually no concrete information concerning who our visitors are, their socio-economic status, what they desire in outdoor recreation, how long they stay, etc. The Beaverhead, and most Forests in Region 1, are sadly lacking in recreation research: especially that having to do with behavioral and cultural profiles. Surprisingly, I found after checking with the State commerce and tourism departments in Montana and Idaho, that they are not that much ahead of us in knowing who their visitors are and what they want to do. They have the usual National trends: the population is aging, baby-boomers are now starting families, people are taking shorter two and three day vacations, there is a dramatic increase in single parent families, their is a distinct population shift to the south and southwest, etc. While these trends are informative it is difficult to reduce their implications to a project of this scope.

The Good Sam Club provided the Forest Service with a survey of their membership. It spoke to the desires of 1000 respondents selected from a total of 10,000 Club members who completed the questionnaire. While most of the questions dealt with developed recreation facilities it was possible to get some overall idea of who the respondents were. This large travel club, which does use Beaverhead National Forest facilities, is composed of 640,000 families. These families spend an average of 42 days annually camping in their recreational vehicles or trailers. The average age of these people is between 35 and 64 years old Their average net net worth in $250,000. One can assume that the majority of motorhome owners using the Forest come close to fitting this profile. It seems a bit too affluent for many of the visitors we see using travel trailers.

Two of the things Good Sam members wanted to see more often on the National Forest System were interpretive experiences and self-guided walks.

The information from Montana, Idaho, and South Dakota, and a National Park Service study talked briefly about what recreational opportunities people were seeking.

A Montana study found that people perceived the State as deficient in historical sites, and museums. Yet the study revealed that this was exactly what the majority of sightseers were highly interested in visiting. The sightseeing, or auto touring, recreationist remains the largest single group of visitors using the National Forest System. A South Dakota study found that people visiting historic sites stayed in the State an average of one day longer just to visit the site. We could probably expect people to take a side trip to the Canyon Creek Kilns, even if it meant stopping overnight in Dillon or Butte.

At an even more subjective level, the perceptions of District recreation specialists was sought concerning what type of people were visiting the Forest, and would likely be most interested in an interpretive facility such as Canyon Creek. The Beaverhead gets a significant number of retirees and families with small children from the local area. They seem to be seeking recreational opportunities including sightseeing, picnicking, and fishing. As Canyon Creek is a favored location for this activity type an interpretive opportunity would probably be something they would incorporate within a broader range of activities.

The Forest's summer tourists are usually passing through the area without regarding it as a destination. Although we do seem to have a small group that returns to favored campgrounds for stays of a week or more each summer season. This non-destination attitude is particularly true of the sightseers. They may be attracted to the nearby historic towns of Bannack and Virginia City, however. Once in these areas visitors often take short trips onto the National Forest pursuing a variety of recreational opportunities.

The Canyon Creek Kilns should be an attractive side trip from Interstate 15 which runs through the Forest. It is the major north-south access into this portion of the state, as well as points north and south of Montana. It is also the lesser used of the two main routes between Yellowstone Park which is adjacent to the Beaverhead's eastern boundary, and Glacier National Park to the north.

1. First-time visitors:

If the interpretive site is properly marketed and promoted we can expect a significant number of first-time visitors. The potential for first time local visitors is very high. The effectiveness of our promotional campaign will determine how many out-of-state tourists passing through Dillon on Interstate 15 make the short side trip to visit the kilns site. With no similar interpretive sites currently on the Forest, there is no way to reliably estimate the actual number of visitors. A reasonable assumption would be in the hundreds every year.

Repeat Visitors:

The potential for repeat visitors to this interpretive site would be almost entirely from local and regional visitors. The local forest users will be attracted to an interesting site, in an attractive outdoor setting, which can be visited for picnics and day outings repeatedly. The other class of repeat visitors is most likely to be students. Once area teachers are made familiar with the site, and if its potential is enhanced by offers to conduct guided tours and on-site lectures, this class of visitor could grow into an important user group.

The site would not seem to be highly attractive to out-of-state tourist on a repeat basis.

We have very poor, and highly dated, statistical data for use on the

Canyon Creek Road. A 1977 traffic count by the Beaverhead National Forest engineers determined these use patterns:

On the Canyon Creek-Quartz Hill Road (#187) at the Forest boundary, east of Wise River, during the period from June 6 to July 7, an eight day sample period found that an average of 18 vehicles entered the Forest at this point daily.

In 1978 a 160 day sample period from June 2 to November 24 at the same sample location found an average daily traffic level of 26 vehicles per day.

During the same year a traffic count point at the Forest Boundary a few miles west of Melrose on the Canyon Creek-Quartz Hill Road, found an average of 28 vehicles a day entered the Forest during the period from June 2 to November 28.

A 1979 traffic count, again at the Forest Boundary on the Wise River end of the Canyon Creek-Quartz Hill Road recorded an average daily vehicle count of 40 per day for a 107 day sample period between June 26 and November 14.

2. Age-group makeup

The Canyon Creek Kilns interpretive site is being planned to interest a broad spectrum of visitors from small youngsters to the elderly.

3. Educational levels

We can expect a wide variety of educational levels to be interested in the interpretive site. Children from preschool age through high school will visit the site with their parents.

Visitors from the Butte, Dillon, and other local areas, will be dominated by people with a high school education. Some college graduates can be expected due to the size of Butte, Missoula, Bozeman, and other local urban areas. The presence of the Montana School of Mines (Butte), the University of Montana (Missoula), Montana State University (Bozeman), and Western Montana College (Dillon), may raise the number of college educated visitors somewhat above other rural areas in Montana.

The educational backgrounds of visiting out-of-state tourists is expected to reflect the educational level of the Nation as a whole. There will be a significant number of college graduates-and a growing percentage-but the majority of visitors will likely have the equivalent of a high school education.

4. Background

a. Urban: the majority of the interpretive site's urban visitors are likely to be from regional centers such as Idaho Falls, Missoula Butte, Bozeman, and Helena. If they are out of region or out of state travelers, they are more likely to be from urban areas.

b. Rural/small town: the vast majority of the rural visitors who are attracted to the kilns will be from southwestern Montana, and to a lesser extent form southeastern Idaho.

c. Origin

The Idaho tourism study referred to above indicated that most of the out-of-state visitors to Idaho came from Montana, Washington, Oregon, Utah, and Canada, in that order. We could expect to see about the same regional interest in our area.

d. Time available

There is no definite time span for visitors to experience the site. One could experience the whole site, from visitor information area, to walking the entire pathway in as little as 15 minutes. An interested visitor could read the visitor information, and spend an hour or more in independent site roving. The average time a visitor would need to read all the visitor information, and take a leisurely walk through the site area, stopping to examine the kilns at some length, would be about one-half hour.

D. Message: key ideas to be communicated

a. From the visitors perspective

1) What are they?
2) What were they used for?
3) When were they built?
4) Who built them?
5) How long did construction take?
6) How long were they in use?
7) How did they operate?
8) How much wood did it take to fill one?
9) Where did they get the wood?

b. From the Forest Service perspective

1) Safety-do not enter the kilns. Parts, or all of the ceilings may collapse.
2) Appreciation of a non-renewable, fragile, cultural heritage resource.
3) How consumptive of natural resources early mining enterprises were.
4) Regrowth and renewal of timber lands, even after massive, unmanaged, harvest.
5) How historically important southwestern Montana is compared to other locations in the State.

E. Location and timing

1. Best location for presenting the message(s)

The theme level of the interpretive messages should be presented at the main interpretive kiosk. People would be directed from the parking lot past the kiosk by the pathway. Site overview photographs, and appropriate historic photographs (reproductions), should be presented here as well. A large Beaverhead National Forest map with the location of the kilns, and approximate area of historic fuelwood cutting to feed the kilns, would be displayed.

The main entrance kiosk is also the best place to display cultural resource appreciation, and anti-vandalism messages, and whatever site safety message may be necessary.

The messages that meet specific objectives which are narrower in range, or more site specific (eg. B2), should be presented on smaller interpretive signs adjacent to individual kilns.

2. Best time for presenting message(s)

This is a free access site, so we have little control over when visitors use the facility. Tours for school and civic groups can be scheduled at any convenient time.

The summer tourist season (June to mid-September) would be the optimum time to reach the greatest number of visitors: local, regional, national, and foreign. The spring season would likely be restricted to local people on recreational outings to make use of other recreation opportunities. In the fall Canyon Creek receives a large influx of hunters. Most are from the immediate area, although out-of-state hunters are frequent also. It can be anticipated that a few of these hunters will stop to tour the site out of curiosity.

F. Media

1. Audio-visual:

a) slide-tape presentation (for schools, civic groups)

A 30 to 50 minute slide-tape presentation could be developed which discusses the history of the Hecla Mining District. The kilns would be prominently featured. The slide-tape show would be targeted at local schools and civic groups.

b) personal-for schools and other groups

Following coordination with local grade school and secondary school social studies teachers, a one to three day lesson plan could be developed reviewing mining history in southwestern Montana, lode mining in particular, and examples drawn from the Hecla Mining District-with the kilns highlighted in the presentation.

2. Auto tour

a) self-guided cassette tape

Auto touring remains the most popular activity on the National Forest System. This existing market should be tapped by developing a self-guided cassette tape tour. The tour would be a loop which could be started from either Dillon, or Wise River. The cassette would guide visitors through the Hecla Mining District with stops at Glendale, the end of the road at Lion Mountain, back through Glendale to the charcoal kilns, and across Vipond Park to the Big Hole River. A brief summary of the Vipond Mining District could also be included.

3. Brochure

A high quality, color, brochure explaining the role and functioning of the kilns, with a thumb-nail sketch of the Hecla Mining District could be developed to promote the new interpretive site, and help recruit visitors to the area. The possibility for funding a brochure from cultural resource site enhancement dollars is good.

4. Interpretive signs

Interpretive signing should be detailed in an addendum to this plan, as an Exhibit Design Plan. This Plan would display actual text to be set at the entrance kiosk, and the entrance to the kilns, and the text and location of smaller interpretive signs at various places within the site. It would set forth the final design specifications for the large interpretive kiosk, and the smaller site specific signing.

It is recommended that a broader Exhibit Plan place interpretive signs at Glendale (with BLM) cooperation, the site of the Greenwood Mill, and on the road overlooking the sites of Trapper City, Lion City, and Hecla.

5. Newsletter

A brief article in the USDA-Forest Service Region 1 newsletter will announce the opening of the Canyon Creek interpretive site.

6. News Media short or feature

a) Magazine

Articles of 800 to 1200 words will be submitted to general interest regional magazines such as Montana Outdoors, and Montana Magazine.

b) Newspaper

A paid announcement (approx. $44 ea.) will be submitted to three or four regional newspapers announcing the opening of the new interpretive facility. These will be similar in

format to the "News From The Forest Service" items we currently submit to announce public meetings and other noteworthy items.

Local reporters will be encouraged to do feature articles on the kiln site. Forest Service representatives will offer to take reporters to the site, and explain its history and use.

c) Radio

Public service news releases will be written for local radio stations in Butte, Anaconda, Dillon, Bozeman, Missoula, Helena, and Idaho Falls.

7. Short-range radio transmitter

We will use the Supervisor's Office short-range public radio band to broadcast a repeating message with a brief summary of kiln history and directions on how to find it, and where to get more information. This radio is currently broadcasting Forest Service messages to travelers on Interstate Highway 15 which passes through Dillon.

G. Special needs-handicapped access, site protection, safety, etc.

1. The site will be made wheelchair accessible through the following design features:

a) The designated path through the kiln area will be hardened with a bituminous asphalt.

b) There will be no stairs necessary to reach or tour the site, changes in grade (eg. from parking lot to path) will be provided with ramps.

c) All textual material will be of an appropriate size so it will be legible to a seated person.

d) The toilet will be handicapped accessible, including an approach ramp if necessary.

e) Picnic tables will be provided which accommodate wheelchairs at the table ends.

2. The interpretive site will be made accessible to visually impaired visitors by insuring that all textual material is printed in large type or letters. If the need exists, we can provide a cassette tape tour for blind visitors.

3. The flat topography of the site, the hardened paths, ramps, and benches which will be placed at two locations within the kiln area, will insure that the elderly will have no special problems touring the site.

4. Special protection: we will rely on informational and anti-vandalism signs to deter destructive activity and abuse of the kilns

and facilities. In addition, employees engaged in other work in the area will monitor the site on a non-systematic basis, but no less than once weekly May 15 to September 15.

5. Safety: visitor parking will be provided to insure vehicles do not obstruct the main road. To this same end, the fence which surrounds the kilns will not have an access from the main road side.

Symbolic barriers will be placed in front of kiln doors on those structures still standing.

Safety and fire regulations will be posted on the main entrance kiosk.

H. Budget

1. Total Cost Estimate: $20,545

a) Planning and design
Phase I-preliminary interpretive planing, and site stabilization (see cultural resource management report for initial site stabilization.

b) Preliminary Construction Estimate
Phase II-facilities design and construction:

1) Trail Construction with gravel base and hot bituminous surfacing: #3.00 per lineal foot; total 1100 lineal feet - $3,300

2) Jackpole fence: $1.50 per lineal foot; total 938 lineal feet - $1,407

3) Excavation For Parking Lot and Access Roads: time and equipment; motor grader Cat. 14 - $68.09 per hour; Operator, 25.54 per hour; D-7 Dozer - $70.65 per hour; Operator - $25.61 per hour - $189.89.
Total: $189.89 per hour, 8 hours per day, 2 days - $3,038.24

4) Crushed Gravel for roads and parking area: 391 cubic yards for parking and road, at $20.00 per cubic yard - $7,819.91

SUMMARY OF FACILITY CONSTRUCTION COST

Trail Construction-gravel and pave	$3,300
Jack and Pole Fence	$1,407
Excavation Parking Lot and Road	$3,038
Crushed Gravel Parking Lot and Road	$7,820
TOTAL	$15,565

To outline parking area with native boulders add an additional $40 per rock; with about 80 rocks needed.

Vault toilet (handicapped) $4,600

Redwood picnic table (handicapped).....$190 ea.

c) Administration

Ongoing annual operation and maintenance: $1000

2. Source of funds and availability

a) CRM Enhancement

Currently $5000 are on hand for all Cultural Resource Management survey, recordation, stabilization, and enhancement needs. This includes the cost of survey and recordation to date, the preliminary site stabilization recommended in the Cultural Resource Management Report, and enhancement activities such as the Exhibit Design Plan and any signing costs associated with it.

b) Recreation Capital Investment

The Canyon Creek Kilns Interpretive Project is on the Forest's Recreation Capital Investment Program, and scheduled for implementation in 1992. It is at the top of the Forest's lists of recreation projects for 1992 funding. It may be moved forward to the 1991 program.

I. Target Date for Completion

1. Phase 1: 1989

2. Phase 2: 1992

J. Information and Skills needed to complete planning

More complete information is needed regarding the specific history of the charcoal kilns. The interpretive message can not be successfully completed without certain additional data.

The Landscape Architect needs to complete a final site plan after the preliminary draft has been approved.

An Exhibit Design Plan needs to be completed.

K Planning and Development Assignments:

Who	Unit/Organization	Assignment	Target Date	Status
E. Levert	Dist. Ranger, D2	On-stie to dis-	10/7/88	Complete
D. McKnight	Rec. Assist., D2	cuss feasibility		
P. Olson	Rec. Forester,D2	of site interp.		
K. Keefe	Landscape Arch.,S.O.			
M. Ryan	Archeologist/Rec. Specialist, S.O.			

M. Wiggins	Regional Office-Geometronics	Scaled site map from air photos.	10/31/88	Complete
M. Ryan J. Hamilton H. McKnight	S.O Archeologist S.O. Archeologist D2 Para-arch.	CRM field survey, site evaluation, site map, and photos.	11/25/88	Complete
M. Ryan	S.O.	Research Hecla, write Sec. 106 Report, forward CRM Report to District Ranger with recommendations for site management.	4/1/89	Draft Complete Need add research
K. Keefe	S.O.-L.A.	Preliminary Site Plan	2/3/89	Draft Complete
E. Levert D. McKnight P. Olson M. Ryan	Dist. Ranger, D2	Hold public meeting for input into site management.	1/18/89	Complete
B. Selway	S.O.-Engineering	Preconstruction cost estimate	3/3/89	Complete
M. Ryan	S.O.-Recreation	Preliminary Interpretive Plan	4/1/89	Draft Complete
M. Ryan	S.O.-Recreation	Exhibit Design Plan	5/1/89	Not Complete Need add research
M. Ryan K. Keefe	S.O.-Recreation S.O.-Land. Arch.	Preliminary rec. for sign and kiosk designs.	4/1/89	Complete

E. Levert	District Ranger	Final Approval of Interpretive Plan	6/2/89	
M. Ryan	S.O.-Archeologist	Coordinate project through NHPA Sec. 106 process, with SHPO and ACHP comments no later than 5/1/89	5/1/89	In Progress
M. Ryan District Staff	S.O.-Rec.	Site prep. and archeological stabilization.	7/14/89	Scheduled on Work Plans
M. Wiggins	R.O. Geometronics	Terrestrial photos. of site and 2 intact kilns..	8/31/89	Scheduled
N. Schluessler	S.O.-Engineering	Traffic counter at kilns; 30 day sample for 90 day period.	8/31/89	Scheduled
W. Webster	Zone Contracting	Advertise Request for Proposals to contractors	2/1/92	
W. Webster	Zone Contracting	Let contract for facility construction.	4/1/92	
Contractor	Private	Construct parking, and pathway, fence, install one toilet, two picnic tables.	7/31/92	

L. Evaluation (Design a means of assessing communication effectiveness into the project).

1. Degree to which objective is achieved:

We will seek a cooperative agreement with the Recreation and Tourism program at Western Montana College. The agreement will allow students in the

Recreation and Tourism program to obtain academic credit while conducting a user survey at the Canyon Creek Kilns Interpretive Site to assess how effectively the Interpretive Plan's goals and objectives are being met.

2. Numbers of visitors contacted:

The District recreation staff will attempt to contact no less than two groups of visitors to the site per week and subjectively assess the Interpretive Sites effectiveness in delivering its messages.

3. Overall visitor reaction:

Overall visitor reaction will be assessed by the formal user survey proposed in cooperation with Western Montana College, the informal contacts made by District and S.O. recreation staff, and by the placement of a locked box at the main kiosk for visitors to record their impressions or suggestions.

APPROVALS:

Name	Title	Date
Name	Title	Date
Name	Title	Date

###

USDA - Forest Service
Beaverhead National Forest

CULTURAL RESOURCES INVENTORY REPORT FORM
(Use additional sheet, as necessary, for any category.)

IF CULTURAL RESOURCE SITES OR ARTIFACTS ARE DISCOVERED DURING PROJECT WORK NOTIFY THE FOREST ARCHEOLOGIST IMMEDIATELY

Abstract: CRM Inventory Report for the Canyon Creek Charcoal Kilns Historic Site, Wise River Ranger District. The site consists of 23 beehive-shaped charcoal kilns, remnants of a log chute, frame platform at the upper end of the chute, collapsed horizontal log structure and can dump associated with the log structure, and assorted historic debris and lesser features.

This historic site is associated with the mining complex consisting of the Hecla Consolidated Mining Company silver-lead mines, at the head of Trapper Creek, and the smelter town of Glendale, MT. several miles below the kilns on Trapper Creek. The Charcoal Kilns functioned to reduce cordwood to charcoal to fire the blast furnaces in the Glendale smelter.

The site is scheduled in the recreation capital investment program for stabilization, enhancement, and public interpretation. This level of site management is an effect to the site, but is considered a bendficial effect. The site is eligible for inclusion in the National Register of Historic Places.

Institution Responsible for Inventory: USDA-Forest Service

Inventory Sponsor: USDA-Forest Service

Project Identification: Canyon Creek Charcoal Kilns Interpretive Project

Project Location: State Montana County Beaverhead

Ranger District Wise River USGS Quad Vipond Park-1958 (15')

Legal Location: T2S, R10W, SE 1/4, NW 1/4, Section 8

Acreage Involved: Project 5 Surveyed 500 Percentage 100

Project Description:

(Describe direct & indirect impacts expected)

The Canyon Creek Charcoal Kilns historic site is recognized as one of the major cultural resources on the Beaverhead National Forest. The structures comprising the site are in need of recordation, and stabilization, in order that their significant historic qualities are not lost through continued natural deterioration and vandalism. The site represents an excellent opportunity to interpret mining history, local and regional historic development, and the history of industrial technology, for the education and enjoyment of Forest visitors.

Anticipated impacts to the site fall within two broad categories:

I. Preservation

Not all of the kilns are preservable. Some have already collapsed or otherwise deteriorated to the point that even major preservation action would not significantly add to their probable lifespan.

Preservation action in the first phase of management will consist of blocking kiln doors where necessary so visitors cannot go inside--probably with symbolic barriers rather than total obstruction of entrances--placing antiquities signs and safety signs at appropriate locations on the site, hand grubbing vegetation away from the foundations of kilns, carefully trimming (rather than pulling out) vegetation rooted in cracks and joints, a low intensity broadcast burn of sagebrush which covers the site and was not on site during operation of the kilns (intensive archeological surveys of the immediate kiln area on several different occasions have determined that there are no flammable historic remains in the immediate kiln area), and removal of hazard trees within the immediate confines of the kiln area.

II. Interpretation

Interpretive facilities at the site will cause more visitation, and the potential for increased vandalism. However, the site is immediately adjacent to a gravel road which is one of the more important recreation accesses into the East Pioneer Mountains portion of the Forest. The site is currently signed with a small (and incorrect) informational sign which very briefly discusses site history. It also has a jack-leg fence in place around the immediate kiln area. The site presently receives a fairly large number of visitors per year, peaking during summer and fall months. Visitation will increase in intensity, but it is not a new impact.

It is anticipated that increased interpretive efforts will explain how valuable the site is to our visiting public, and will, thereby, reduce acts of vandalism through education. Signing will also indicate the legal penalties for looting and vandalizing historic properties.

Actual interpretive improvements (facilities) may include a small parking lot to move visitors off the main road; a small picnic facility with one to three tables, a vault toilet, and interpretive signing appropriate to the site. Pathways from the parking lot to, and through, the site will be hardened with bituminous asphalt to make the site wheelchair accessible. The Interpretive Plan for the site (in progress) will specify signing appropriate to the scale and setting of the historic site. A brochure interpreting the site in greater detail, and an auto tour cassette interpreting a loop-tour of the kilns, Hecla, and Glendale, are planned at a later date.

Files Search:

SHPO/UM Site File Checked: Date 11/17/88

Results: SHPO letter of reply indicated they have no record of the charcoal kiln site; UM site records have no record of any sites or surveys in the immediate area

S.O./District Site Atlas Checked: Date 11/16/88

Results: negative data

S.O./District Inventory Records Checked: Date 11/16/88
Associated Reports: none

Other Sources: National Register of Historic Places, with monthly supl.; Montana State Historic Preservation Plan; S.O. Lands Section: homestead entry surveys, mineral surveys, CLO Plats, land status records, historic Beaverhead N.F. maps (pre-1940); and the following additional sources...

Beaverhead County Museum
BLM mining records, Billings, MT.
Dillon Public Library
Montana Bureau of Mines and Geology, Butte, MT.
Montana Historical Society, Library
Montana School of Mines, Library, Butte
University of Montana, Mansfield Library
United States Geological Survey, Butte
Western Montana College, library-Montana collection, Dillon, MT.

Informants: Otto Sassman, Dillon, MT.; Skip Willingham, Forest Archeologist, Targhee National Forest; Leonard Lively, former owner of Hecla Company mines, Melrose, MT.; Dick Berg, geologist, Montana Bureau of Mines and Geology, Butte, MT.

See also the attached Bibliography.

Results: Montana State Historic Preservation Plan lists Canyon Creek Charcoal Kilns, Glendale Historic District, Hecla, Lion City, Trapper Cr. Charcoal Kilns--all historic mining sites related to, or in the general area of, the Canyon Creek Kilns. The State Preservation Plan is in error in several respects concerning the kilns. The dimensions stated are incorrect. The Glendale smelter is referred to as a copper smelter. Copper was a minor fraction of the ore. The ore from the Lion Mountain mines was chiefly silver-lead ore. The Plan implies that the hills surrounding the kilns are bare today due to the historic harvest of timber for fuelwood. They are not bare except in those areas of natural sagebrush-grassland habitat type. Those timbered areas near the kilns which have stumps from cutting in the 1880's are now heavily timbered with second growth lodgepole pine over 100 years in age class. Similarly, the citation for Glendale says it "shifted" to copper smelting over time. Copper was never an important metal in the Hecla District. The statement referring to the Trapper Creek Charcoal kilns in the State Historic Preservation Plan attributes the Glendale smelters with a consumption rate of 100,000 bushels of charcoal per day. This is grossly erroneous. There were never more than three furnaces working at the Glendale smelter, and they had only a 50-ton capacity each. The amount of charcoal needed to fuel a furnace charge varied from 15 pounds on small furnaces to as much as 100 pounds on larger furnaces. In a 24-hour period of smelting, a furnace the size of those at Glendale could be expected to use approximately 10 tons of charcoal. At 20 pounds of charcoal per bushel, this amounts to only 1000 bushels, or 3000 bushels in one 24-hour period for all three furnaces at the smelter.

Project Setting (In narrative form this section must include a description of the project area including major physiographic features, topography, and any factors conditioning the presence or absence of cultural resource sites.)

The Canyon Creek Charcoal Kilns are located in a narrow, flat-floored canyon with steep canyon walls to the north and south. Elevation at the kilns is approximately 6500 feet. The site has a southerly aspect. Bedrock geology consists mostly of granite. Soils are chiefly alluvial and colluvial silts and sands overlain by light and dark brown silty loam. Topography has been shaped by pleistocene glaciation, and fluvial episodes related to flooding by Canyon Creek. Glaciation has left prominent glacial erratics along the canyon floor.

Vegetation consists of a mosaic of timber and sagebrush/grassland along the canyon floor, with sagebrush/grassland in some higher elevations also. The immediate area of the kilns is a sagebrush flat with big sage, Idaho fescue, bluebunch wheat grass, and related species. Willows, and scattered cottonwoods, grow immediately adjacent to Canyon Creek--a perennial stream. In forested areas lodgepole pine is the dominant species, with juniper, small stands of Engleman spruce, Douglas-fir at lower elevations, and whitebark pine at higher elevations, also present. Extensive timber harvest took place in the forested locations during the late 1800's. This harvest has created large stands of even aged lodgepole and Douglas-fir less than 160 years old.

Major faunal species common to the area include elk, mule deer, moose, and black bear. Mountain goats occur in the area of the kilns. Lakes in the area support trout populations, as does Canyon Creek.

Fieldwork (In narrative form this section must include date(s) of work, names(s) of field investigators(s), and full description of field methodology.)

Dates of field work: November 1 to November 4, and November 8 to November 10, 1988

Surveyors: Mike Ryan, John Hamilton, Harriet McKnight

Field survey began by walking parallel pedestrian transects. These transects were oriented in an east/west direction. Individual transects were verified by hand-held compass at intervals along the survey route. Transect interval varied between 25 and 50 meters depending upon terrain. The survey area began at the 6800-foot contour level on the south side of Canyon Creek. Transects ran east/west for a distance of approximately one-half mile on either side of the kilns. These transects were carried north to the top to the ridgeline immediately behind the kilns (see attached quad map). The survey area was examined for both prehistoric and historic cultural resources. Every opportunity was taken to observe mineral soil to determine if buried cultural material or features were indicated. Trowel tests were conducted at random intervals along each transect. Ground visibility was good to excellent in the sagebrush-grassland areas, and moderate to poor in timbered areas. No prehistoric cultural resources were noted during the survey.

One historic site was recorded, which consisted of five related features. These were the brick charcoal kilns, a collapsed and much deteriorated wooden chute running from the top of the ridge directly behind the kilns to approximately 75 meters from the kilns on the valley floor, a large wooden platform at the head of the chute, and a collapsed single pen, horizontal log structure adjacent to the top of the chute. This log structure was likely a habitation, and it had a fairly large historic trash scatter on the downhill side.

The kilns, chute, log structure, and trash scatter, were recorded in field notebooks (see continuation sheet for feature-specific data); a preliminary site map was sketched using hand-held compass and steel tape; 75 35mm black and white photos were taken of the features, as well as a lesser number of 35mm color prints, and 35mm color slides. Samples of three varieties of brick, mortar, and the render which covered the kilns, were collected f r laboratory analysis.

Cultural Resources Inventory:

Prehistoric Isolates: 0

Prehistoric Sites: 0

Historic Isolates: 0

Historic Sites: 1

TOTAL LOCALITIES RECORDED: 1

RESEARCH OVERVIEW

I. INTRODUCTION

Research into the history, construction, functioning, and related aspects of the Canyon Creek Charcoal Kilns made it soon apparent that any clear understanding of the kilns also required an understanding of the history of mining in Trapper Creek, and the development of the towns of Glendale, and Hecla, Montana. In the broader sense then, this is an analysis of the Hecla Mining District (sometimes called the Bryant Mining District) from the discovery of the Trappper Lode in 1873, to the decline of metal mining in the District after 1900.

Mining in southwestern Montana was the earliest impetus for a host of other development. The placer discoveries at Bannack, Virginia City, Nevada City, and numerous other locations in Alder Gulch, brought Montana Territory its first large influx of immigrants from "the States" and adjacent territories. Mining provided the base from which other development grew. Agriculture in the Gallatin Valley, the Beaverhead Valley, the Deer Lodge Valley, and a few other areas of lesser importance, developed to serve the needs of miners. The first early cattle drives from Oregon into Montana Territory were designed to take advantage of a ready market in southwestern Montana. It is no accident that one of Montana's earliest and largest livestock enterprises (Poindexter and Orr) was established in Beaverhead County adjacent to the rich placer mines, and their throngs of busy miners. Mining produced a similar influence on commerce, banking, transportation, law, education, and social life in general.

While it is true that the placer deposits of southwestern Montana were transitory, they were followed quickly by the expanded industrial development of mineral lodes. In the history and development of lode mining in Montana, the Hecla District ranks as one of the most important and productive silver and lead Districts in the State (Karlstrom: 1). Most of the Hecla's mineral value was in silver and lead, although copper, zinc, and gold were produced in lesser quantity. Geach (1972:111) called the Hecla District the "...treasurehouse of Beaverhead County, having produced ore valued at nearly $20,000,000." Commentators of the period pointed to the Hecla District as equal in importance to any producer inside the silver triangle: Butte, Philipsburg, and Helena (Malone: 145). The Hecla Consolidated Mining Company paid stockholder dividends

every year between 1881 and 1901--no mean feat when one considers that much of Montana's mining history recounts various promoters who made wealth by mining stockholders rather than precious metal.

A measure of the Hecla District's importance can be gained when one considers not only the benefit to stockholders of the Hecla Company ($2,027,500 in a twenty-year period), but the $7,765,245 paid out for taxes, labor, supplies, and miscellaneous expenses during the same period (Sassman: 242). Much went to out-of-territory suppliers; however, much of it also fueled local development in southwestern Montana. George Conway, a principle officer in the Hecla Consolidated Mining Company, stated that his Company, and other producers in the District, took out over $22,000,000 by 1901 (Sassman: 242).

The Glendale smelters reduced ore from the Hecla District for over twenty-five years. The end came on 29 August 1900 when Hecla Company President Henry Knippenberg ordered them shut down. He had the smelters torn down in the fall of that same year (Sassman: 243).

The decline of the mines in the Hecla District meant the inevitable decline of the mining camps which supported them. An understanding of the development and role of these camps is as crucial to an understanding of the Hecla District as an understanding of the mining enterprise itself. Glendale, Hecla, and their forerunners, Trapper City and Lion City, provide important examples of the urbanization which took place on the mining frontier.

Knight (1973: 29) suggested that the size of the frontier settlement was not of central importance. Rather, what was it's relationship to the surrounding area, what were the discernible stages of development, and what function did the settlement perform? These are the useful questions to ask; answers can by approached through an examination of Glendale, and the other settlements in the research area. Trapper City, Lion City, Hecla, and Glendale occupy succeedingly higher levels on a continuum from rough mining camp to fully developed town. The historic development of Glendale also allows us to look at a frontier mining town as a pre-railroad and post-railroad phenomena.

Mining camps were a unique phenomena in the trans-Mississippi west. The mining frontier was an urban frontier. Prospectors were as isolated and individualistic as fur trappers, ranchers, or early homesteaders. But unlike these other extractors of Montana's natural resources, when a strike was made people rushed in and formed communities (Smith: 97). These developing camps often occupied isolated mountainous regions, and were in turn served and supported by trade centers in larger valleys (Smith: 103). Bannack, Virginia City, and later Butte and Dillon, functioned in this way toward the settlements in the Hecla District.

Knight (1973: 39) pointed out that frontier towns of the mid to late 19th century were not established as political entities, but as outposts of military strength, or centers of economic activity. This lead to a noncontiguous and transitory settlement pattern (Smith: 98). Miners intended to make a fortune and return "home;" they often had no intention of staying as permanent residents in a camp. The undeniably transitory nature of mining camps should be seen as a particular example of a broader 19th century trend--rapid mobility was an emerging national trait even at this early date (West: 118).

It is instructive to consider Glendale, and the other settlements in the Hecla District, relative to theories of urban growth. Knight (1973: 35) recognized

five stages of town growth: 1) foothold, or village nucleus; 2) town building which sought more than additional business alone; 3) consolidation in the post frontier period, in which familiar urban institutions were introduced or expanded; 4) a non-directive and slow growth spiral thereafter; 5) and technological growth (especially during World War II and after). Thompson (Knight: 34) proposed a slightly different growth hypothesis: 1) a stage of export specialization in which one industry or firm predominates; 2) a stage of export complexity, in which the exports become diversified and the number of firms increases; 3) a stage of economic maturation, in which local industries replace imports; and 4) a stage of regional metropolis, in which the export of services becomes a major function.

Depending upon how one interprets Knight, Glendale may have reached stages three or four. Trapper City, Lion City, and the settlement of Hecla, never moved beyond stage one. Thompson's growth hypothesis, based on levels of commodity export, is even more clear-cut. None of the Hecla District settlements, including Glendale, moved beyond stage one. The Hecla District produced one commodity--ore. Value was added at the Glendale smelters; ore was reduced to bullion. Aside from small amounts of commercial lumber, and perhaps cord wood and charcoal, for a limited local market, Glendale remained a single commodity town with no real industrial diversification.

A study closer to the Hecla District analyzed the characteristics common to five Idaho mining towns of the 19th century (West: 118). Four common traits were documented across all five examples: 1) numerical domination by men; 2) ethnic diversity; 3) transience (in terms of population rather ran the length of time the settlement existed); and 4) unequal distribution of property. The last refers to the fact that the group which owned the most value in real property were the community merchants. All four historic settlements in the Hecla District exhibit an identical cluster of traits to those found in Idaho. Over time the first and third characteristics became less pronounced in Glendale, but all remained characteristic throughout the life of the community.

No settlement wanted to remain a rough and tumble mining camp. They all had pretensions. Each sought the refinement and stability of urban civilization. Glendale's history is an example of this quest for development, refinement, and stability. The inhabitants of early mining camps were certainly aware that they were on the "frontier." Judging by at least one contemporary opinion, however, some felt there was little hardship associated with life in a mining camp.

> The committee desire [sic.] to call the special attention of immigrants to the fact that pioneer life in Montana is not what pioneer life was in the early settlement of Ohio and the western and northwestern states. To-day [sic.] immigrants will find in Montana all the comforts, conveniences and many of the luxuries of a high civilization, with comparatively no hardships. (The Montana Capital Times, April 23, 1870, No. 24, p. 4)

II. HISTORIC OVERVIEW

A. Discovery

Prospectors working from the established settlements at Alder Gulch, Bannack, Vipond, and Argenta doubtless searched Trapper and Canyon Creek for placer gold. No documentation of their work, nor the location of any gold strikes, occur in the record. Gold might usually be expected in a setting like Trapper Creek, but

"...virtually none has been found (Lyden: 11). Whatever the geologic or mineralogical reasons for the lack of free gold, miners did not give up on the area. By the early 1870's lode mining was increasing in importance, and Trapper Creek was a natural prospect situated as it was between the established Districts of Argenta and Vipond.

P.J. Grotevant and James A Bryant, with a number of partners, filed on the Trapper Lode August 16, 1873. Actual discovery had occurred a year earlier when William Spurr found the Lode, calling it the Forest Queen. Spurr and Bryant were partners. They did no work on the claim, so during the following year when the discovery was open for relocation, Bryant organized a trapping expedition to the headwaters of Trapper Creek. While there he relocated the original claim. Grotevant was out searching for strayed horses when he accidentally came upon the outcrop of the Trapper Lode. He returned to camp and convinced his trapping partners that they should remain and stake out the area (Sassman: 232-235). Many silver lodes were staked before some of the men returned to Bannack to have the claims recorded. News of the strike spread, and men rushed to the new diggings. Among these was Noah Armstrong who had been at Birch Creek (adjacent to Trapper Creek) a few days prior to the Grotevant discovery. Armstrong, and men working for him, quickly located the Cleve, Avon, Alta, and Atlantis lodes: September, 1873. The Atlantis proved to be the richest mine in the District. This nucleus of mining properties allowed Armstrong to play a major role in the development of the Bryant (later Hecla) Mining District. On the day Armstrong located the Atlantis, R.E. McConnell and D.S. Dewey located the Cleopatra lode. The Cleopatra produced the largest quantity of ore in the District (Sassman: 234).

Log cabins, and probably tents and various other types of shelter, sprang up immediately, and Trapper City was born in 1873. (Wolle: 187). Sassman (1941: 23) lists "...miners cabins, several saloons, and a 'hurdy gurdy'" as the main structures in Trapper City. Glendale was also established in 1873 when Armstrong had John Langley build the first cabin. Armstrong constructed a smelter at the site of Glendale during the same year. It had two blast furnaces of 70-ton capacity each (The Atlantis, February, 16, 1881). Apparently before the smelter was operational, the mines in Trapper Creek shipped 10 tons of high grade silver-lead ore to Swansea, Wales, for refining that first year. The ore averaged 35% lead, 140 ounces of silver, and 1 ounce of gold (Geach:112). One of the early needs recognized by the miners was for improved access to outside markets. They constructed a road from the Trapper Creek and Lion Mountain diggings to the main roadway along the Big Hole River in 1873-1874 (Sassman: 235; Wolle: 187).

B. Early Development

Trapper City flourished for a brief period. It became apparent that the properties located about a mile up the gulch on Lion Mountain were potentially more important. When Noah Armstrong began shipping ore from his Atlantis Mine, a new settlement called Lion City grew at the foot of the mountain. The Trapper Mine shut down, as mines on Lion Mountain were coming into prominence. The last inhabitant of Trapper City gave up and moved to Lion City in 1878 (Sassman: 237; Wolle: 187).

Lion City boasted two general stores, three saloons, two hotels, boarding houses for miners, a school, and post office by 1878 (Sassman: 238; Karlstrom: 4). Inhabitants included miners, merchants, gamblers, prostitutes, and a small

number of families (Sassman: 238). Doubtless there were also many teamsters, and common laborers not considered skilled miners.

Lion City served the immediate needs of people at the mine mouth. Glendale served a very different function, and it too was steadily growing. Early lode miners were forced to deal with a number of serious, interrelated, problems. After securing sufficient capital for development, they had to get heavy mining and milling machinery to the lode. Once equipment was in place and working they had to haul tons of ore to distant places for eventual processing. Hauling ore great distances was very expensive. The mining records are replete with examples of ore being hauled from Southwestern Montana to Corrine, Utah, and shipped by rail for eventual smelting in Swansea, Wales. This option worked only for very high grade ore which could pay the cost of transport. A preferable solution seemed to be establishing smelters as close to the ore body as possible, although this was also expensive. That is exactly what Noah Armstrong did. Consolidating and strengthening his mining, milling, and smelting interests, Armstrong formed the Hecla Consolidated Mining Company in 1877. He purchased the Cleopatra, True Fissure, Hecla, and a number of other properties. This gave him control of all the important mines on Lion Mountain (Sassman: 241; Wolle: 188). He continued to build up the Glendale smelter, and with the smelter, the town.

Just when, and what, Armstrong constructed at Glendale in the early years is a matter of some confusion. The editor of Glendale's weekly paper (The Atlantis, February 16, 1881) writing several years after the fact, indicated the first smelter had two 70-ton blast furnaces in 1873. Karlstrom (1948: 5) said there was a 40-ton smelter built in 1874. Wolle (1963: 190) was even more confused. She said Armstrong built a 40-ton furnace at Glendale in 1877. Elsewhere (Wolle: 190) the 40-ton smelter was built by Armstrong and Dahler in 1875. The facility also included a 10-stamp mill, roaster, and leaching works constructed in 1878 (Wolle: 190).

On one point everyone agrees. The original smelter burned down in 1879. The loss was quoted in The Atlantis at $100,000, and continued to say Mr. Armstrong was not insured. Construction of a new smelter at Glendale began immediately after the fire, in 1879 (The Atlantis, February 16, 1881; Sassman: 238). Prompt reconstruction was imperative. The Glendale smelter was not only processing ore from the Lion Mountain mines, but also from mines in the adjoining Districts of Highland and Vipond (Karlstrom: 5).

The ore was moved from the mines to Glendale in 10-ton wagons pulled by teams of six to eight horses. The effort required 100 horses daily for the short but difficult trip (Karlstrom: 4). Bull trains and mule trains hauled bullion from Glendale to the terminus of the Utah and Northern Railroad being built north into Montana Territory from Utah. The jerk-line mule outfits of 16 to 20 animals then returned to Glendale with freight and passengers (Sassman: 238). The existing Forest road is likely the original miners road from Lion Mountain, through Glendale, to at least Melrose, widened and upgraded for modern traffic (Karlstom: 3).

A glimpse of the nonindustrial side of Glendale in the late 1870's is possible from contemporary sources. Alma Coffin arrived in Glendale in 1879. Her father was the newly employed school teacher. She described the small settlement as having one main street "...winding up the gulch," and small frame houses and log cabins scattered on the hillside (Not In Precious Metal Alone: 156-157). Miss Coffin also mentioned the smelter, roaster, office, assay office, warehouse,

blacksmith shop, iron house, powder houses, coal sheds, sack house, stables, hospital, a Masonic Lodge, an Oddfellows Lodge, racetrack, roller-skating rink, opera house, and brewery (Cheney: 119-120). It's not clear if the elaborate establishments (i.e. roller rink, etc.) were in place when Coffin first arrived in town. More likely, they were added later during her residence in Glendale. The Glendale post office opened its doors in 1875 and remained open for the next 25 years (Cheney: 119).

Coffin wrote that more than 100 men were employed in Glendale in 1879. She said there were some families, some men who intended to send for their families; others intended to go home after making their fortune (Not In Precious Metal Alone: 156). She observed that the men were "...usually hustling, ambitious, ...and anxious to make their 'stake.'" She reports a favorite expression: "I'm not in the mountains for my health" (Not In Precious Metals Alone: 156). Coffin's population figure (100) may have referred specifically to miners. Wolle (1963: 188) puts the figure in 1878 at 950, including 125 children under twenty. Coffin mentioned dancing and card playing as the most popular entertainments, which supports the view that the skating rink and other elaborate recreational facilities were not available in 1879 (Not In Precious Metals Alone: 157).

Glendale's commercial establishments focused on the wants and needs of the miners, usually younger, single men. Basics such as a cook stove and furniture for a two-room frame house the Coffins had built were purchased in Virginia City (Not In Precious Metals Alone: 156). Boarding houses, restaurants, saloons, and general merchandise stores catered to the miners day and night. The "City Restaurant," for example, served meals 24 hours a day. The menu included such delicacies as fresh oysters (The Atlantis, December 28, 1879). Advertisements in The Atlantis mentioned no rates for boarding houses, restaurants, and similar establishments, but 12 years earlier Helena miners paid $14 per week for board at the "Young American Hotel." The hotel charged casual customers $1 per meal, or $2.50 per day (The Weekly Republican, September, 13, 1866, No. 26). Alma Coffin's letters make mention of the fact that "Prices are high and change smaller than 'two bits' is not usually considered..." (Not In Precious Metals Alone: 157).

While ethnic diversity was a prominent factor in the life of Glendale residents, they shared a wide-spread intolerance for a certain class of immigrants. The Atlantis' classified section displays an add for the Sam Woo Fung Gee laundry, and there may have been a small community of Chinese engaged in service type work. Wolle (1961: 188) quotes an article in the Butte Miner of April 7, 1878, which mentions a "John Chinaman" employed as a miner at Armstrong's Atlantis mine. However, when the number of resident Chinese threatened to become too large, or they sought jobs in a market dominated by caucasians, Glendale residents became decidedly hostile. The general tone of community feeling toward Chinese can be inferred from the first line in a demeaning article in the paper, "One of the almond eyed pigtails from the Flowery Kingdom, passed up the Big Hole Valley, Friday, mounted on a Mexican burro..." (The Atlantis, December, 28, 1879). A later article in the same publication described a visit to Glendale by a railroad contractor who was recruiting Chinese labor to help construct the narrow gauge Utah and Northern Railroad. Any hint of Chinese taking jobs from "Americans" met with immediate and straightforward belligerence. The editor feared "herds" of Chinese coolies overrunning the area. He recommended the citizens make clear "...it will be rather unhealthy climate for them" (The Atlantis, September 20, 1880).

Interestingly, Native Americans seemed to fare better. An article in The Atlantis (December 28, 1879) notes that the Bannack Indians took part in a generally uproarious Christmas celebration. The Bannacks seem to have been common visitors in Glendale.

Glendale in the late 1870's was certainly remote, but it was not isolated in the sense that mining camps like Bannack and Virginia City were isolated in the early 1860's. Besides the Hecla Company's freight wagons, other commercial haulers worked to keep the Hecla District in touch with neighboring communities. J.C. Beard ran the "Glendale Express," a local stage line. The coach left Glendale for Butte every morning at 8 AM. Passengers paid $3 one way, and $5 round trip, (The Atlantis, December 28, 1879). Travel in 1879 was not without its vexations. "The Missoula, Deer Lodge, Helena, Terminus, and Benton coaches were all lost for the time being, during the recent storm. Passengers enjoyed the novelty of camping in the Wilderness overnight" (The Atlantis, December 28, 1879).

Glendale harbored grand political aspirations for a brief time. As the importance of Virginia City declined, and the Territorial legislature was looking for a new home in 1875, Glendale residents made an unsuccessful bid for location of the Territorial capital in their town (Karlstrom: 5).

Six years after its founding Glendale became a legal entity. Probate Judge Alvin F. Sears posted a notice in The Atlantis saying he had just entered the plat of Glendale townsite at the U.S. Land Office in Helena. Glendale residents had two months to present an affidavit describing their lot(s), improvements, and value of real property, to secure legal ownership (The Atlantis, September 11, 1880).

C. The Hecla Consolidated Mining Company

Affairs seemed to be going well for Noah Armstrong, and the Hecla District, as the 1880's dawned. Ore from the Silver Quartz Mine was smelting at $1000 per ton, "The ores are chiefly galena, gray copper and yellow carbonates, easily fluxed with iron, lime, and charcoal, a very little of them requiring roasting" (The Atlantis, October, 13, 1880).

Base bullion from the Glendale smelter was sent to Balbach and Sons in Omaha for final refining. These shipments averaged $100,000 in value over a period of many months (The Atlantis, February 16, 1881). For example, during a two-week period in September of 1880 the smelter shipped 126,000 lbs., and 156,500 lbs. of bullion to Omaha (The Atlantis, September 1, and 8, 1880). Armstrong's company was also constructing improvements to the mining operation. "The Hecla Company is building a tramway from their lime quarry to the wagon road [from Lion Mountain] where the main tramway will evidently intercept it (The Atlantis, September 8, 1880). The main tramway spoken of conveyed ore from the mines to Glendale via narrow gauge rails and ore cars. The main tramway was built at a cost of $96,000 (Sassman: 243).

Despite its apparent vigor, Armstrong's company was $77,785.13 in debt as of January 1881 (Sassman: 242). Armstrong decided to sell his interests in the Hecla Consolidated Mining Company to E.C. Atkins of Indianapolis, who owned the Atkins Saw Works. The saw works was managed by Henry Knippenberg, who was a particularly able businessman. Knippenberg accepted the position of general manager of the Hecla Company and arrived in Glendale in April of 1881. He

established his headquarters and residence in Glendale, and immediately set about reorganizing the Company.

Knippenberg divided Hecla Consolidated into three operations, each with a resident superintendent. The mining operation was managed from Hecla, a new camp Knipperberg established at the foot of Lion Mountain. The smelter works were managed at Glendale. The Company's iron mines in Soap Gulch were directed from the town of Norwood, near the mines (Wolle: 190). Norwood had its own post office between 1882 and 1893. The Postmaster was John M. Parfet (Cheney: 198). He also managed the iron mines for Hecla Consolidated. That Knippenberg was an able general manager, and his reorganization successful, is seen from the Company's balance sheet. By December of 1881 Knippenberg had erased the Company's debt, and showed a profit of $237,729.76 (Sassman: 242). It was well for the people of the Hecla Mining District that Knippenberg straightened out the Company's business. Armstrong employed between 200 and 800 men during the two years immediately before he sold. His payroll amounted to between $30,000 and $90,000 a month (The Atlantis, February 16, 1881). Sassman (1941: 244), quoting an 1882 source, put the number of men employed at the mines and smelter at 150 to 200, with a monthly payroll of $50,000.

Knippenberg built the town of Hecla in 1881. It was about one mile above Lion City at the base of Lion Mountain. It served the needs of miners and others with boarding house, dwellings for Company officials, an office, warehouse, stable, powder house, and a number of commercial establishments (Wolle: 190). The Hecla post office opened in 1881 and first closed in 1892. It reopened and closed as Hecla's fortunes rose and fell: 1894 to 1900, and 1913 to 1914 (Cheney: 133). One of Hecla's chief functions was to facilitate mining operations throughout the winter. Knippenberg employed two men full-time to keep the trails on Lion Mountain shoveled clear so miners could get to work (Karlstrom: 5).

Knippenberg soon turned his attention to the growing amount of lower grade ore coming from the mines. In 1882 he built what Sassman (1941:244) claimed was the first concentrating mill in Montana. It "concentrated" 100 tons of low grade ore at a time into a product with less bulk and greater value than the parent ore. The small settlement of Greenwood grew around the Mill. It consisted of a boarding house, four dwellings, an office, stable for Company horses, and blacksmith shop. Knippenberg had Greenwood connected by telephone to Hecla four miles above, and Glendale seven miles below (Wolle: 190-191). The Greenwood Mill successfully treated 177,092 tons of second class ore between 1882 and 1898, when it ceased operations.

The mid-1880's saw Glendale's smelter and community growing. The smelters three 50-ton blast furnaces were supported by two crushers, and a large roaster (Sassman: 242-243; Wolle: 190). The vigor of the Hecla District's production and community growth were insured by the arrival of the Utah and Northern Railroad. The railroad terminus was moved from Red Rock south of Dillon to the "...mouth of Glendale gulch" on September 1, 1880 (The Atlantis, September 1, 1880). The tracks did not reach the terminus (which became Melrose, MT.) until the spring of 1881 (Sassman: 238-239). The rails finally reached Butte on December 21, 1881 (Smith: 4). It is clear that Knippenberg's successful reorganization of the Hecla Consolidated Mining Company was aided immeasurably by completion of the railroad. The Hecla District was linked with Butte on the north and Salt Lake City on the south--two major centers of east-west transcontinental rail traffic.

The arrival of a transcontinental rail link ushered in Glendale's most important period of development. The town remained a linear settlement strung along the north bank of Trapper Creek. The lower end was known as "Ragtown," and the upper end near the smelter and homes of Company officials was called "Toney Hill" (Wolle: 192). The growth in Glendale's size and complexity can be judged by the fact that over 45 businesses were now advertising their services in town. These establishments included two physicians; a lawyer; a jeweler; four public hotels; two livery stables; three meat markets; two wagon shops; a bank; four blacksmiths; ten saloons; one brewery; one public restaurant; one oriental laundry; eight general stores; one hardware store; two shoemakers; two drug stores; two wholesale liquor dealers; a weekly newspaper; racetrack; rollerskating rink; and one stage line (Sassman: 240-241). The Hecla Company built a public water system, which also provided fire protection for the community. Glendale's population rose from 700 in 1881 to approximately 3,000 in 1882 (Wolle: 192).

Glendale was struggling to move from rough mining camp to fully developed industrial and commercial center. This meant the social life of the community had to develop beyond that provided by the numerous saloons. Glendale had an Opera House by 1885. It attracted various traveling theatrical troupes whose performances were popular and well attended. The town could also brag about its marching band, the Silver Cornet Band (Wolle: 192-193). There is even social conscience evident. Wolle reports (1963: 191) that the women of Glendale demanded that the smelters two smoke stacks be constructed higher than planned to help dissipate the fumes from town.

The arrival of the railroad meant growth for Melrose too. The town was founded as a transshipment point between Glendale and its markets and suppliers outside Montana Territory. The Hecla District received general supplies, mining supplies--such as Pennsylvania coke at 19 cents a pound, mining machinery, and the like, through Melrose (Wolle: 192). The present Melrose Mercantile building was originally the Company-owned Hecla Mercantile and Bank building (Leonard Lively, personal communication). The Hecla Mercantile acted as Company agent in dealings with the railroad.

Certainly the Hecla Consolidated Mining Company was the dominant industrial and social force in the mining district. In 1885 Hecla Consolidated owned the Hecla, Trapper, Franklin, Cleve and Avon, Marc Anthony, Cleopatra, Adriane, True Fissure, and Atlantis Mines: the biggest and best producers in the District. But Hecla Company mines were not the only producers adding to the District's wealth and influence. The Monroe Mining Company owned the Pride of the West, Wall Street, Condor, Minnie Gaffney, Moffat, and Maynard Mines. Young and Company owned the famous Keokuk. Joe Keppler and Company owned the Oneida and Lion Mountain. Another important mine, the Elm-Orlu, was owned by Driscoll and Lord (Karlstrom: 5-6). Together these mines brought the Hecla District a prominence that rivaled any silver district in Montana, and many in Colorado and Nevada.

D. Decline

The 1890's began well enough for the Hecla Mining District. Glendale was important enough to appear on a map of Montana's leading towns and cities in 1892 (The Daily Tribune, March 27, 1892). The Sherman Silver Purchase Act of 1890 was a boon to the silver interests in Montana. It required the United States Government to purchase twice as much silver as it had previously. It also added to the amount of silver money in circulation. However, the Act

threatened to undermine the Nation's gold reserve. President Grover Cleveland was convinced that the Act helped precipitate the Panic of 1893. The President called Congress into special session, and in 1893 the Sherman Silver Purchase Act was repealed. This was a serious blow to the silver producers in the Hecla District. These external forces were only the beginning of Hecla's problems. Production from the mines declined rapidly after 1893. The Cleopatra Mine played out in 1895. The Atlantis followed soon after--although it continued small scale production until 1903. The reduced level of ore production supported only two blast furnaces at the smelter, and they ran at a loss in 1893 (Sassman: 247-249). The end was in sight for Hecla Consolidated. Ore reserves were depleted, and national trends greatly reduced the price of silver. Yet the Company managed to show a profit for stockholders. It had paid annual dividends of 6%, with 1% extra for every year except 1898, between 1870 and 1900 (Karlstrom: 6). The decline of Hecla Consolidated can be traced in Company employment. In 1893 Knippenberg's work force was 125 men, who were paid about $25,000 per month. By 1895 the work force for a Company that had once employed upwards of 800 men had dwindled to 70 (Sassman: 248-249).

The Glendale smelter was finally closed down and dismantled in 1900. Low grade ore, and slag, were then shipped to the American Smelting and Refining Company in Omaha (Sassman: 243).

Litigation brought a final end to the Hecla Consolidated Mining Company. In 1904 a Company foreman brought what amounted to a class-action suit on behalf of 40 miners who had gone unpaid in the amount of $26,544. The Company did not contest the suit, and the Court found for the plaintiffs in the full amount (Sassman: 251).

These miners were virtually the sole remaining inhabitants of Hecla and Glendale when they left the District during the summer of 1904 (Wolle: 191; Sassman: 251).

E. After Bankruptcy

The Company stockholders ordered the board of directors to sell the assets of Hecla Consolidated. Knippenberg was owed $28,011 by the Company, and purchased it from the other stockholders for that amount. He quickly resold his interest in the property (Sassman: 252). Hecla had become a "leaseholders camp." Mining activity between 1904 and 1923 was carried on by leaseholders shipping slag from the Glendale smelter, and concentrator tailings from Greenwood (Karlstrom: 8). The single notable development during this period was the introduction of electric power to Hecla in 1912 by the Montana Power Company. The electricity supported an effort to make low grade ore pay through modern milling technology (Karlstrom: 6).

In 1923 out-of-state investors formed a new Hecla Consolidated Mining Company. The new Company paid $230,000 for the major claims in the District. Another $152,000 was poured into development work at the mines (Karlstrom: 6). The effort was a financial failure.

George B. Conway, a former officer in the original Hecla Consolidated, purchased the property in 1928 (Sassman: 252). He shipped smelter slag, and ore from the mine dumps for a year. Conway sold the property in 1929 for half a million dollars to the Foundation Company of Utah. Their efforts to revitalize the mines also ended in failure (Karlstrom: 8).

The intervening years have seen this once-wealthy property sold to a number of owners, and worked by small leaseholders. One of the more recent owners, who held the property for a considerable period, was Leonard Lively of Melrose. He maintained that the mines have always continued to produce, although on a much reduced scale. Recently these famous old mines came to the University of Mississippi in the estate of the last owner. Today a single leaseholder works the property (Leonard Lively, personal communication).

II. CHARCOAL PRODUCTION

A column in the Glendale Atlantis (February 16, 1881) which extolled the virtues of Glendale and the Hecla Consolidated Mining Company began with a headline which read "The best grain, hay, timber, and charcoal market in Montana." If there was a well developed market existing in 1881 it is reasonable to assume that the use of charcoal at the Glendale smelter was occurring for some time past. It was likely the smelter fuel used when Noah Armstrong built his first furnace in 1873. At this point a reasonable assumption is all that can be made. There is very little reference to the actual production and use of charcoal in the primary or secondary sources examined during this research. This is especially surprising as White (1983: 112) indicates the production of charcoal was responsible for 50% of the cost of blast furnace operation. As discussed below, charcoal making was a capital and labor intensive undertaking requiring many men--some of whom were highly skilled. Why so little direct reference to charcoal making occurs at Canyon Creek is something of a mystery. The lack of direct evidence has made it necessary to rely heavily on analogies drawn from other historic charcoal making sites.

Early blast furnaces represented a significant undertaking for mining companies, but one which some chose to accept for a variety of reasons--mostly economic. These early blast furnaces needed to be small enough to transport, especially prior to rail access. They needed a source of power, usually a steam boiler, to operate the machinery, and in the case of hot blast furnaces, to heat the air forced into the furnace. The furnaces needed fire brick to line the fire box (Conservation Study: 2). The only other special need was available water, which in the case of Glendale was brought by ditch and flume from Trapper Creek (Sassman: 242).

The ores smelted at Glendale were not refractory (difficult to reduce). They did require blast furnace treatment because ore with a silica content greater than 4% needed a blast furnace. The ore was not sulfurous; however, so roasting in a reverberatory furnace was unneeded, or little needed. The Nevada Comstock silver ores, by contrast, were highly refractory and needed seven hours of roasting prior to amalgamation in a blast furnace (Young: 115). To "charge" a blast furnace, a highly controlled mixture of ore, flux (lime, dolomite, iron ore, etc.), and a solid fuel were placed in the furnace. The commonest smelter fuels were coke, charcoal, or a combination of the two (Conservation Study: 1984). White (1983: 109) claims "...the determining factor in selecting the appropriate fuel, at any given furnace or in any geographic region, was cost alone." Prior to the arrival of the railroad, coke imported from the northeast United States was too expensive for southwestern Montana smelters--or others in the west for that matter. Following the access to eastern markets provided by the railroad there was a change from reliance on charcoal as blast furnace fuel, to a mixture of coke and charcoal. This occurred at Glendale after 1881. Coke was shipped to Melrose from Pennsylvania. In 1895, for example, the Hecla Company imported 1000 tons of coke. This coke cost $16.65 per ton delivered at Melrose, and an additional $2.35 per ton to haul it by wagon from Melrose to

Glendale. The smelter consumed 10 tons of coke per day (Sassman: 243-244). So the stockpiled 1000 tons would last only about three months. At this rate of consumption it is clear why the Hecla Company continued to absorb the additional expense of charcoal production for a portion of the blast furnace fuel.

Both coke and charcoal have distinct advantages and disadvantages as blast furnace fuel. Coke was not crushed under the weight of the charge, but was very expensive to import. Charcoal required less blast, it was a good reducing agent because it had a higher porosity than coke (burned hotter), but it tended to collapse under the weight of the charge, reducing burning efficiency (Conservation Study: 3). White (1983: 108) lists these specific advantages for charcoal:

1. it is not easily crushed by weight of the charge
2. when lighted it burns without flame, evenly, and the temperature can by raised or lowered by changing the blast in the furnace
3. it has greater porosity which allows a better use of the blast
4. it is often purer than coke or coal; due to a vegetable base it has a smaller amount of native mineral impurities which retard combustion

The use of charcoal in the smelting of ore had a long European history prior to its introduction to colonial North American. Pennsylvania smelters were reducing iron ore in charcoal fueled furnaces by 1719 (Kemper: 2). Prior to 1837 charcoal was the only fuel capable of successfully firing a cold blast furnace. The innovation of heating the air before forcing it into the furnace (perfected in Scotland in 1837) allowed anthracite coal to take the place of charcoal in blast furnaces. Coal did not produce sufficient heat in a cold blast furnace for efficient ore reduction (Kemper: 5). The iron making industry in the United States did not turn from charcoal to coal, and then to coke, until about 1855 (White: 106-107). Charcoal production in the eastern states declined greatly after the introduction of coked coal in the mid-1800's (Zeir: 81). In the west, however, charcoal remained an important industrial fuel source until the development of modern gas-fired, electrically-powered, smelting equipment after 1900.

The actual production of charcoal involves locating a source of cordwood, felling the trees, limbing, bucking into cordwood lengths (4 feet), transporting the wood to the burning site, and burning--or "coaling"--of the wood. Cordwood was reduced to carbon by two methods. It could be burned in earth-covered mounds, called "pits" by the charcoal burners. It could also be burned in brick or stone kilns designed for the purpose.

Charcoal pits were usually from 40 to 60 feet in circumference. The surface debris and duff was scraped to the outside of the circular area leaving a depression six to twelve inches deep, with a "collar" of soil around the perimeter. Cordwood was carefully stacked in tiers about twelve feet high. A central chimney, and a tunnel from the center of the pit to the outside edge, were left open. The tunnel was filled with chips and other small flammable material as a means to light the pit. The entire pit was then covered with a layer of clay soil two to five inches deep. Clay soil was necessary to form an airtight seal for slow, controlled, burning. A 60-foot pit required about 60 cords of wood, and produced about 22 tons of charcoal (Beck, Bill Carlsen interview, September 15, 1986; Young: 116). Doubtless, the Hecla Company's need for charcoal was filled by the pit method in the early years. That was the pattern throughout most of the mining west. Pits required less capital, less skill to construct, and probably somewhat less skill to operate than kilns. As

a mining district developed, the pit method of charcoal burning was sometimes supplanted; sometimes it existed side-by-side with charcoal kilns. This second situation applied to the Hecla District. In 1895 the Hecla Company produced charcoal in 38 Company-owned kilns (not all were at Canyon Creek, some were located near Lion City and Hecla), and also purchased pit-burned charcoal (Sassman: 243-244). It is probable that this practice had occurred for some time. The smelter used 1,000,000 bushels of charcoal in 1895--after the period of peak ore production had passed. No cost figures were found for the Company-produced kiln charcoal. The pit-burned charcoal produced by independent burners was delivered to Glendale for 11 cents per bushel (Sassman: 244).

Just as the decision on which kind of fuel to use in blast furnaces was a matter of corporate importance, so too was the decision concerning how to produce the charcoal. In a late 19th century technical paper a mining engineer discussed the advantages and disadvantages of pit versus kiln charcoal. He favored kiln produced charcoal for a number of reasons. The amount of labor in kiln burning was less than pit burning. The kiln burning process was easier to control and the condition of the charcoal could be better determined throughout the process. Kiln productivity was greater than pits. Pits produced from 30 to 35 bushels of charcoal per cord. Kilns would yield 45 to 50 bushels per cord. The yield was 15 to 20 percent greater, and the cost of operation 30 percent less. Finally, kiln-burned charcoal was cleaner as it was not mixed with dirt and sand from an earth cover. The only drawback to kilns was their lack of mobility (Egleston: 374).

A. Kiln Construction

Charcoal kilns came in several shapes and many sizes. The form and construction might depend upon the builder's idiosyncrasy, skill and knowledge, or the dictates of terrain. They could be rectangular, circular, or conical. Fuel quality did not differ from one to another. The principle drawback to round and rectangular kilns, which became less popular in the mid-1800's, was their structural instability. They were more prone to crack in the joints, and therefore, required more repair. All kilns expanded and contracted with the fluctuations in temperature. Metal bands or ropes were placed around them for support. These bands did not prevent cracking in the round and rectangular kilns, and the cracks could not be permanently closed. The constant cracking and re-cracking, which introduced unwanted air into the kiln, made the burning process difficult to manage, and reduced the yield (Egleston: 374-389). In Egleston's words (1880b: 396):

> "It seems to be very generally conceded in the Eastern States that the conical kilns holding from 25 to 35 cords are the most profitable. They are less expensive in construction, more easily filled, cheaper to manage, give better yield, and can be burned more frequently than any other varieties of kilns."

For comparative purposes, Egleston's (1880b: 396) professional description of ideal form and construction, as published in the 1880 journal, are quoted below:

> "Kiln manufacture-
> -usually of red brick, rarely brick and stone
> -foundation usually made of stone
> -brick should be sufficiently hard to resist fire
> -acids produced by burning attacks lime mortar, so brick should be laid up with fire clay mortar with a little salt added

-mortar is principally to fill joints, any air through joints would reduce kiln yield
-frequent headers to tie bricks together should be used
-floor of the kiln should be two rows of bricks set edgewise, or clay, or any other material that will pack hard
-center of the floor should be six inches higher than sides
-mortar joints should be carefully pointed
-wash used on the outside of the kiln is a clay suspended in water covered with a coating of coal-tar to make the whole structure waterproof"

Egleston (1880b: 390) continued to describe the conical kilns with which he was familiar:

"-they were usually smaller than the round or rectangular varieties
-they were intended to hold 25 to 45 cords of wood
-they were built to require no bracing of any kind
-they were often built into a hill to make access easier to the upper charging door
-they may be built on flat ground in which case there was no upper door, but only a charging hole in the top, reached by a ladder
-in the best kilns there were three to four bricks between vents at the bottom of the kiln"

One of the most perplexing things Egleston has to say in his entire paper is "Such kilns as this can be built by almost any man" (Egleston: 397). Considering the above descriptions, and looking at the complex and impressive brick work at the Canyon Creek kilns, it is difficult to imagine anyone but a skilled mason who could build such structures.

The cost of kiln construction was greatly influenced by local factors. Most important of these was the availability and cost of material and labor. It cost $500 to build a conical kiln of 35 to 50 cord capacity in New York. A similar kiln in Michigan cost $600 (Egleston: 397). Murbarger (1965: 27) quotes the cost of a brick or stone kiln in Nevada, similar in size to those on Canyon Creek, at between $500 and $1000 each. It was more cost-effective to build smaller kilns (between 160 and 180 cubic meters in capacity). The cost of more structures was offset by a higher quality charcoal (Egleston: 374).

B. Kiln Operation

Kiln operation can be divided into three parts: charging the kiln, burning the wood to charcoal, and discharging the kiln.

1. Charging

The act of "charging" a kiln referred to filling it with cordwood. The wood was not simply pitched in, but stacked very precisely to allow complete, even, burning. The cordwood was four feet long. The diameter was not important, although a uniform diameter was helpful for even burning. Large and small diameters were stacked together with the larger being split to stack better. The kiln was filled from the main charging door on the front of the structure until it was no longer possible to reach the top of the stack. The upper portion of the stack was laid in from the smaller charging door at the upper rear of the kiln. A conical kiln 30 feet in diameter required the labor of four men and two horses for one 12-hour day. This size kiln could hold 35 cords of

wood and produced [illegible] bushels of charcoal--50 bushels to the cord (Egleston: 393-395).

Egleston (1880b: 377, 394) described the usual method of charging a conical kiln. His discussion touched on kilns in New York, Vermont, and Utah. If he was able to describe the charging process in general terms for all localities one may assume there was a more or less standardized system across the charcoal industry, although certainly with some local variation. Skids two inches in diameter were laid about three feet apart around the radii of the kiln floor to begin the charging. These skids acted to allow smoke and gas to escape to the vents. If confined within the kiln this volatile material would eventually explode. A chimney about four feet square was made in the center of the kiln. A tunnel or air channel ran from the chimney to the door. This air channel was filled with shavings and light wood. When the kiln was ready for firing the upper door was closed and sealed with mortar. In some cases the upper charging door was left open during the firing process to allow for the escape of smoke and gases. The kiln was ignited through the lower door by firing the air channel. When the wood was well ignited four vents on either side of the door were closed with a brick and mortared tight. Other vents around the bottom of the kiln were then loosely closed to allow air inside to aid combustion. The main door was closed and sealed tight with mortar. A final comment mentions that firing was always done at night, without any explanation why.

2. Burning

The process of reducing wood fiber to charcoal consisted of partially burning the wood in an oxygen poor environment. The amount of air admitted to the kiln regulated the temperature. Open flame, which would consume the wood, was not desirable. Just enough oxygen was introduced to create a low burn of sufficient temperature to drive the moisture and combustible gases from the wood. The end result was an almost pure carbon residue.

The entire art and science of producing a good grade of charcoal centered on the manipulation of the kiln vents, and the ability to understand conditions inside the kiln from external signs. Once the kilns were fired, the charcoal burners never left the site until the burning was completed. They watched the smoke coming from the three rows of vent holes around the bottom of the kiln. The flow of air was regulated based on the color of the smoke, and by it they were also able to determine conditions within the kiln. Thick white smoke came from the topmost row of vents, usually for three to four days. This signaled water being driven out of the wood as steam. In one to four days, depending upon the size of the kiln and the weather, a yellowish smoke began to appear. Blue smoke followed next. When it began pouring out of the top vents it was allowed to burn for twelve hours. Blue smoke indicated the kiln was very hot and the firing process almost complete. After the first 12 hours, the top vents were closed. In another 12 hours the second row of vents smoked blue; they were then closed also. The bottom row of vents were opened and the fire was drawn down to the very bottom of the kiln. When the burners judged the bottom of the kiln to have been thoroughly burned, the bottom row of vents were closed and sealed (Egleston: 388; 394).

The burning time for a 35-cord kiln was between six and eight days. When the kiln was completely fired all vents were closed by inserting a brick, and mortared tight. The kiln was allowed to stand two and one-half to three days. Eight to ten barrels of water were then thrown into the kiln from the top charging door. The charcoal could usually be drawn the next day. The kiln

cooling time was extended to five days if it was not watered (Egleston: 394). Burners determined that the kiln was cool enough to draw by feeling the sheet metal doors. When the doors were cool to the touch the kiln could be opened and drawn (Egleston: 389).

3. Discharging

Two men working a twelve-hour day could "draw," or discharge, a conical kiln 30 feet in diameter and 20 feet high. (The Canyon Creek kilns average 23 to 26 feet in diameter and 17 to 19 feet high. Their capacity is approximately 25 to 35 cords.) It required one day to charge, 13 days to burn, and one day to discharge a kiln of this size (Egleston: 395). Speaking of a charcoal works with 13 kilns, Egleston (1880b: 395) said it was operated by eight men, and the kilns could be "turned" (i.e. charging through discharging) as many as 22 times per year.

C. Kiln Comparisons

The documentary record allows some comparison between charcoal kiln operations in the eastern and western mining regions. These comparisons cannot be exact, or sometimes even consistent. Each narrator recorded differing details of kiln construction and operation. The kilns in Pennsylvania, and other eastern areas referred to, supported furnaces used to smelt iron ore. Western kilns referred to were generally supporting furnaces smelting one or more precious metals, as well as base metals.

The earliest commentator was Egleston. He studied the operations of charcoal kilns in four locations: Plattsburg, and Wassaic, New York; Readsboro, Vermont; and American Fork, Utah. Egleston (1880b: 390) records the following kiln data at each of these sites:

Location	Basal diameter	Height	Capacity/cords
American Fork	26ft.	20ft.	25
Plattsburg	30ft.	20ft.	35
Wassaic	30ft.	23ft.	40
Readsboro	28.6ft.	28ft.	45

It took 33,000 bricks to construct a kiln at Plattsburg, and 40,000 to build one at Readsboro (Egleston: 393). Contrary to his earlier statement about a clay and coal-tar wash to seal the kiln, he said the Utah kilns were whitewashed after every burning to waterproof them (Egleston: 395). The remnants of whitewash or "render" are still visible on the Canyon Creek kilns. The kilns at American Fork, Utah, burned 35 cords of wood and produced 1000 to 1200 bushels each-about 45 bushels to the cord. In 1875 a bushel of charcoal cost 18 cents delivered at American Fork.

Central Nevada's Reese River Mining District offers some examples of the Nevada charcoal industry in another silver-lead district. At Ward, Nevada, stone kilns were 30 feet high and 22 feet in diameter--decidedly more conical than those at Canyon Creek (Murbarger: 59). The smelters in Eureka, Nevada, used 1,200,000 bushels of charcoal per year (Murbarger: 58). The kiln volumes at Eureka ranged from about 25 to 75 cords (Zeier: 84). The Eureka Consolidated Mining Company used 4,600 bushels of charcoal daily in their smelting operations. They stockpiled 120,000 bushels. The Richmand Consolidated Mining Company, also of Eureka, used 4,700 bushels of charcoal per day in 1874. The stockpile they kept

on hand amounted to 215,000 bushels (Murbarger: 26). An average cost for charcoal throughout the west in the mid-1870's was 25 cents per bushel. Eight years earlier lead smelters at Oreana, Nevada, were paying 65 cents per bushel (Murbarger: 26).

Quoting an 1877 Eureka Sentinel newspaper article Murbarger (1965:27) notes that a single craftsman built 15 conical kilns in one summer. Each kiln was reported to be 25 feet in diameter, with a capacity of 1,400 bushels. The 15 kilns required 600,000 bricks in construction. This is in agreement with Egleston's (1880b: 393) 40,000 bricks per 30-foot diameter kiln at Readsboro.

Closer to Montana there is limited data for a charcoal kiln operation in southwest Idaho's Birch Creek Mining District. The first smelter in the Birch Creek District was constructed in 1882. A somewhat later smelter operated at Nicholia, Idaho. A charcoal kiln operation was started 10 miles away on Birch Creek to support the smelters at Nicholia. The town of Woodland grew up around the kilns. The 17 kilns at Woodland (four of which still stand) had a capacity of 30 cords each. No measurements were given in the reference, but judging by the capacity, they were similar in size to the Canyon Creek kilns. Each kiln produced 2,000 bushels of charcoal. The charcoal cost 13 cents per bushel delivered at the smelter. A contemporary newspaper account states that burning time was only two days (Conservation Study: Appendix). This cannot be correct. What the paper may have been describing was the rate of discharge. Each kiln may have been discharged sequentially at two-day intervals.

Little documentary evidence could be found relating directly to charcoal production or cost at the Canyon Creek kilns. The Glendale smelter used charcoal at a rate of 100,000 bushels a month in 1895. To supply their charcoal needs the Hecla Company operated 38 kilns (Sassman: 244). The locations of these other kilns have not been confirmed. They were reported to be on Trapper Creek near Lion City, and on Sucker Gulch (Leonard Lively, personal communication). The Hecla Company also purchased charcoal from independent pit burners for 11 to 13 cents per bushel (Sassman: 244).

D. Transportation

Exactly how the charcoal at Canyon Creek was handled after discharging is uncertain. Ten-ton ore wagons with six and eight-horse teams were used to haul ore (Wolle: 188) These may well have been employed in charcoal hauling as well. Leonard Lively (personal communication) said the charcoal was hauled to Glendale loose in wagons, but this could not be confirmed. Again, information from other charcoal operations must serve as guides to what may have taken place at Canyon Creek. It is certain that there was a good road up Canyon Creek from Glendale. Large wagons hauling tons of charcoal could not use anything less than a developed road that had periodic maintenance. In addition, there was a steam-driven sawmill in Canyon Creek six miles above Glendale, at a place called Canyon Creek Park. The advertisement for the sawmill in the Glendale Atlantis (January 26, 1881) claimed there was an excellent road to the sawmill from Glendale. The kilns are only five miles distant from Glendale.

The 19th century iron smelters in the eastern United States hauled charcoal in wagons which averaged 200 bushels each (White: 112). Egleston (1880b: 395), discussing American Fork, Utah, said that upon discharge the charcoal was packed in bags of two and three bushels each. This bagging process utilized a wooden table three feet high. The table top had a hole 18 inches square under

which the bag was suspended. The charcoal was shoveled onto the table, then pushed into the bag. He noted much charcoal was lost in this bagging process.

In Eureka, Nevada, charcoal arrived at the smelter in wagons stacked with four tons of the fuel (Young: 119). Each ton represented 142 bushels of charcoal (Zeier: 87). Sixteen and twenty-mule teams pulled four wagons hitched together (Young: 119).

In the Birch Creek Mining District (southeastern Idaho), the closest comparable area to the Hecla District, charcoal was hauled from the kilns at Woodland to the smelter at Nicholia in two wagons hitched together, and pulled by six horses. These wagons had racks four feet high in which 400 bushels were loaded (Conservation Study: Appendix).

III. WOOD FIBER AND CHARCOAL PRODUCTION

A locally available source of good wood was critical to the success and growth of a mining district. Timber was consumed to provide domestic fuel and building materials--both in the form of rough lumber and round logs. It was a source of industrial and commercial fuel to fire steam boilers. The miners were voracious users of timber for mine studs, lagging, and all the other supports needed to keep the mine from collapse. The need for a good smelting fuel further encouraged intensive timber harvest. Coke was unavailable, too expensive to import, and/or remained too expensive to use alone in the furnace. So mining companies turned to locally available fuel for their smelting works. As White (1983: 113) noted, "...without adequate and readily accessible timber even the simplest and least capacious furnace was fated to economic failure." The process of transforming wood fiber to charcoal was in itself a cost saving measure. Charcoal was a very efficient fuel with much less volume and much less weight than cordwood. It cost much more to haul cordwood over any distance than it did charcoal (Young: 116).

Presently, we can only speculate why some of the Hecla Company's kilns were sited on Canyon Creek. It might have been the level ground for ease of building; it might have been to take advantage of the water in a large, perennial, stream; it may have been for the access provided by a good existing road; it may have been for usable local clay and sand for bricks and mortar. Whatever other factors played a role in occupying the site, it was certainly to exploit the vast timberlands at the head of Canyon Creek, and in nearby Vipond Park.

Charcoal burners were not fussy about which species of wood they used; whatever was available worked. In the eastern United States both hard and soft woods were burned. In timber-poor areas such as Nevada, virtually anything was burned. Pinyon pine, juniper, mountain mahogany, even sagebrush, found their way to the kilns (Zeier: 84; Young, 113). The Hecla District was favored with large stands of lodgepole pine, some fir, and a few lesser species.

Work in the charcoal industry seems to have been seasonal in many places. The burning season of spring through fall was mentioned above (Zeier: 86). Pit charcoal especially could not be produced with deep snow on the ground, or during windy weather. Woodcutting, however, was a winter task. Trees were felled, limbed, and bucked, to cordwood length. It was then hauled to the burning site on horse or mule-drawn sled (Kemper: 8; Zeier: 86). Egleston (1880b: 375) has this to say about seasonality:

> "I have seen the kiln abandoned, because the charcoal made was not good, in both Northern and Southern states, when the wood was cut in summer and charged with the leaves on. Good charcoal could not be made of such wood by either the kiln or the meiler (i.e. pit) process. No wood should be cut for metallurgical charcoal before the fall of the sap or after its rise."

In this respect the wood cutting portion of the charcoal industry paralleled the broader logging industry. Prior to the advent of logging railroads, wood was cut and decked in the winter, floated to the mill in the spring, and the logging camps were shut down in the summer.

At present there is no information known which would indicate when or if the Canyon Creek charcoal operation was seasonal.

A brief review of the rate of charcoal consumption will aid the discussion on the rate of timber harvest below.

The rate of charcoal consumption in the eastern iron industry depended upon the furnace used--cold or hot blast. The dates for Armstrong's first two furnaces, and certainly the Knippenberg smelter operation of 1881, both probably used a hot blast furnace. An eastern hot blast iron furnace consumed 155 twenty-pound bushels to produce 2268 pounds of iron--3100 pounds of charcoal for slightly over a ton of iron (White: 113).

The smelters in Eureka, Nevada, processed an ore similar to the makeup of that at Hecla. Smelting one ton of silver-lead ore in 1880 required 25 to 35 bushels of charcoal. In that year all the smelters at Eureka consumed 1.25 million bushels (Young: 117). At this rate of consumption 42,857 cords of pinon pine were needed to produce the charcoal. Depending upon site productivity, between eight and ten cords of wood could be harvested from one acre. That is, it required somewhere between 3,571 acres and 5,357 acres of pinon-juniper woodland to fuel the Eureka smelters for one year (Zeier: 86). The equivalent of eight square miles fell to the woodcutters axe in a single year.

In the same year, 1880, the eight smelters at Leadville, Colorado, were using between 76,791 bushels of charcoal for the smallest, to 1,094,870 bushels for the largest (Emmons, S.F.: 638). These smelters were fueled by Colorado's pine forests which doubtless produced more wood fiber per acre than Nevada's pinon-juniper woodlands. Still, the timber needed to support only Leadville's portion of the Colorado mining industry must have been staggering. Emmons (1886: 638) noted that in 1880 these smelters used between 3,600 cords of wood for the largest to 400 cords of wood annually for the smallest smelter operation--just to fire their boilers!

Western smelters were not much more consumptive than their eastern counterparts. One Pennsylvania iron furnace producing two tons of iron per day needed 240 to 250 acres of good woodland capable of producing 5,000 to 6,000 cords each year. A second smelter used 7,000 cords per year cut from a four to five-mile radius around the furnace. In these hardwood forests, each furnace needed between 800 and 1,000 acres of good woodland if it was to be assured a perpetual supply of wood through re-growth (White: 113).

In attempting to calculate the impact of charcoal production on the timberlands of the East Pioneer Mountains, a number of questions arise. A number of assumptions must also be made. Lee Harry (Forest Silviculturist) is personally

familiar with the Canyon Creek and Vipond Park areas. He provided the following information on wood fiber yield. These calculations apply to a pure lodgepole stand, even though a small amount of Douglas-fir is present in the area. Lodgepole in Canyon Creek produces about 7,000 board feet per acre. Two cords (4ft.x4ft.x8ft.) of fuelwood can be produced per thousand board feet. Therefore, about 14 cords per acre can be cut in these lodgepole stands.

This number seemed quite low considering the apparent density of the stands in the area. Especially since the most productive sites in central Nevada's pinon-juniper forests produce only two cords less. Harry approached the problem through a different set of calculations. There are approximately 200 lodgepole per acre in Canyon Creek. Assuming an eight-inch DBH (diameter breast high); and an overall useable height of 60 feet for a mature lodgepole; each tree yields .07 cords; or 14 cords of wood per acre. Both calculations estimate 14 cords of fuelwood per acre. That estimate is, therefore, used for stands present on the site historically. Harry and I have personally observed cross-cut sawn stumps in lodgepole stands adjacent to the Canyon Creek kilns. It is assumed that they represent a historic harvest of the area for cordwood and mine timbers. These stumps are consistent with an 8-inch DBH, and the distance between the observed stumps is comparable to the distance between current living stems.

Consider the year of 1895, a period of greatly declined production. Only two furnaces were in operation in 1893, and by 1896 only one was still in use (Sassman: 243-244). Sassman (1941: 243) reports the Hecla Company used 1,200,000 bushels of charcoal to fire one or two furnaces in 1895. One could get 45 bushels of charcoal from one cord of pine wood (Egleston: 396). At this rate it would have required 26,667 cords to produce 1,200,000 bushels of charcoal. One acre of timber in Canyon Creek will produce 14 cords of fuelwood. It would, therefore, take 1905 acres to produce 26,667 cords. In other words, in 1895 the equivalent of three sections were cut to fire one or two furnaces at Glendale.

It remains a common community memory among the older people in Melrose that all of the Trapper Creek area was "denuded" for mine timbers, fuelwood, and charcoal (Leonard Lively, personal communication).

The cost of fuelwood varied as widely from place to place as did the cost of other necessary commodities. The availability of timber, the haul distance necessary to move it from forest to town or kiln, and the availability and wages of woodcutters, were the principle factors affecting the cost of fuelwood. A good woodcutter in the eastern hardwood forests could produce about two cords of wood per day (White: 112). During the winter of 1866 and 1867 a cord of wood brought $40 to $50 dollars in Eureka, Nevada (Young: 114). A few years later the cost of fuelwood had gone down considerably, despite what must have been a shrinking of the timber base close to mining communities. In 1880 a cord of wood cost $4.50 to $5.00 in Leadville, Colorado (Emmons, S.F.: 638). It cost as little as $3.75 per cord in American Fork, Utah, during the same year (Egleston: 395). In Butte, a cord of wood cost $6.00 wholesale to merchants, hotel keepers, and the like (The Frontier Index, January 16, 1880). Even at this rate for the raw material, it is likely that the cost of fuelwood represented at least 30 to 40 percent of the cost of smelter operation when the cost of procurement, processing, and haulage are considered.

If the rate of cordwood production was comparable to the two cords per day in eastern forests, then woodcutters were not badly paid for their labor. If a

woodcutter could command from eight to ten dollars a day for delivering two cords of wood to the smelter or charcoal kiln, then he was as well paid as a skilled miner in 1870. In Virginia City, Montana, skilled placer miners received from four to seven dollars per day working for a claim owner. Common laborers were paid three to five dollars per day. Good mechanics received five to eight dollars (The Montana Capital Times, April 23, 1870, No. 24, p. 4).

IV. STATUS AND ROLE IN CHARCOAL PRODUCTION

There was a clear division of labor in the charcoal industry which separated woodcutters from charcoal burners, and sometimes each of them from the teamsters who delivered the charcoal to the smelters.

In the early 1860's mining camps most jobs were held by "Americans." This was true of woodcutters also. American labor cut and hauled the fuelwood in the early days of the Comstock lode, for example (Young: 114). Over time the job of cutting fuelwood seemed to fall more and more to immigrants, while native born people moved to other occupations. By the time Hecla Consolidated was buying fuelwood, the woodcutters were Canadian and French (Wolle: 191). That the Hecla Company employed their own woodcutters is certain. A news item in The Atlantis appeared about the time Armstrong sold the Company to the Atkins Saw Works--"All the men employed as choppers in Canyon Creek, by the Hecla Co., were discharged last Thursday, causing a general surmise that the company had sold. But nothing definite is known, however, as yet", (The Atlantis, January 19, 1881).

Even after the turn of the 20th century, fuelwood cutting still seemed to be the purview of definite ethnic groups. The woodcutters in an area north of Butte (Bernice, MT.) who supplied wood for charcoal pit burning were mostly Finnish (Bill Carlson interview).

Charcoal burners were most often identified as Italian, and usually immigrants. Some of them had followed the trade in Italy (Young: 119; Zeier: 86). In the western mining districts charcoal burners apparently occupied the bottom of the economic and social ladder--not only because they were recent immigrants, but specifically due to their trade. Such work was not highly valued.

After 1875 Nevada's extensive charcoal industry was almost exclusively Italian. These coal burners were paid less than one-half the wage of a common mine laborer--about ten dollars per week (Murbarger: 26). Often these burners were paid in script redeemable only at certain stores in town (Zeier: 88). As a group they occupied a tenuous, and easily exploitable, position between the woodcutters upon whom they were dependent for raw material, and the teamsters who were contracted by smelter owners to deliver the charcoal at a certain price. Indeed, Nevada's charcoal industry seems to have been largely controlled by the teamsters who acted as middlemen between charcoal producer and consumer.

The situation in the Hecla District may not have been so bleak for the burners. Here too they were Italian. However, it is clear that some Italian charcoal burners acted as independent entrepreneurs supplementing the charcoal produced in company-owned kilns. Sassman (1941: [illegible]) maintained that the Italian burners not only produced the fuel, but delivered it to the smelter for 11 cents per bushel. A one-line news item confirms "That independent coal haulers are delivering charcoal" (The Atlantis, September 8, 1880). The editor did not indicate if these haulers were also the charcoal burners, or teamsters buying directly from the burners. Local folklore at Melrose says that the Hecla

Company imported many Italians directly from Italy to work in the mines. Some of them may have found their way into charcoal production. Apparently these men were more highly valued than their countrymen in Nevada. The story continued that after some time in this country the men grew homesick. In order to keep them in Montana Territory the Company sent to Italy for brides. A trainload of women arrived at Melrose, and the match-making took place on the platform (Leonard Lively, personal communication). This tale could not be documented, but I heard it more than once, in Melrose and Butte.

The charcoal burners situation in the eastern states seems to have been much better than the western mining camps. Charcoal burners, or colliers, as they were called, were regarded as highly skilled. They were usually the highest paid workers at an iron works. In many cases they were better paid than the furnace managers (White: 112). Exactly what caused the wide difference in socioeconomic status between the two groups of burners would be a useful question to answer.

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Evaluation of National Register Eligibility: the Canyon Creek Charcoal Kilns are eligible for inclusion in the National Register of Historic Places under all four criteria by which cultural properties are evaluated for significance, [36 CFR Section 60.4]:

(a) are associated with events that have made a significant contribution to the broad patterns of our history--the Canyon Creek Kilns were critical to the successful operation of the Hecla Consolidated Mining Company's silver--lead smelter at Glendale, Montana. These kilns allowed the Hecla Company to produce a locally available, relatively inexpensive (compared to imported blast furnace fuels), efficient, smelter fuel without which it would have been impossible to smelt the ore from company mines. The Hecla Company was the most important mining company in the Hecla Mining District; a Mining District which was as important as any in Montana for more than 25 years. The kilns are illustrative of the broad patterns of the urban, industrial, mining frontier in Montana. They are associated with a period of early mining capitalization, and resource extraction, in Montana.

(b) that are associated with the lives of persons significant in our past--both Noah Armstrong and Henry Knippenberg were significant persons in local and regional Montana history. In the case of Armstrong, he not only discovered one of the most productive silver-lead mines in Montana, he was an early town builder and developer who influenced the rate and course of settlement in southwestern Montana. Following his retirement from active participation in the affairs of the Hecla Mining District, he retired to a large ranch in the Jefferson Valley, where he raised thoroughbred horses. One of his horses, "Spokane," won the 1889 Kentucky Derby in record-setting time. Henry Knippenberg was an industrialist of great local and regional importance. He brought the Hecla Consolidated Mining Company to its zenith. He built the town of Hecla, and greatly influenced the growth of Glendale. He served in the Territorial legislature, and was only a little less influential than the "Copper Kings" in Butte.

(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value--the Canyon Creek Kilns are illustrative of a type of charcoal production facility in use throughout the United States from at least the early 1800's to about 1900. They are representative of a conical type kiln which came to be the most important kiln design. These kilns exhibit many design features which were common across the country, yet they possess some variations of local influence. To observe the kilns that are still complete, and then to look at the brick work in an exposed cross-section of a collapsed wall, is to convince the observer that these structures are the work of a master brick mason.

(d) that have yielded or may be likely to yield information important in history or prehistory--it has not been determined if the charcoal burners who operated these kilns lived near them, as was common practice elsewhere. If the location of their habitations can be determined, it is possible that subsurface archeological remains will yield important information on ethnicity, socioeconomic status, subsistence systems, settlement types, artifact assemblages, and other significant data.

Recommendations: I recommend that the Canyon Creek Charcoal Kilns be developed as proposed for public interpretation. The interpretive development will have beneficial effects to the structures themselves in that money will be available

for stabilization and enhancement. It may eventually be possible to reconstruct one or two kilns as they were originally. Interpretation will heighten the visiting public's knowledge of area history and resource use, as well as increasing public understanding of, and appreciation for, cultural heritage properties.

The Canyon Creek Charcoal Kilns should be formally nominated to the National Register of Historic Places prior to 1992. The Kilns are National Register eligible in their own right, but they also form an important contributing element in a larger, discontiguous, historic district which would encompass most of the area that was historically the Hecla Mining District. This prospective historic district is not completely under the management of the Beaverhead National Forest. Much of the historic town of Glendale (and little remains of it) are in private ownership. The site of the smelter remains is administered by the Bureau of Land Management. The historic mines at Lion Mountain are all on patented claims. The Forest Service, therefore, can effectively influence only the management of the Canyon Creek kilns. It may be possible, however, to work with the other owners to develop an integrated management approach which would allow for expanded interpretation of the various components of the historic district.

J. MICHAEL RYAN, Forest Archeologist
Principal Investigator

Date: 22 November 1988

Appendix 1: Portion of U.S.G.S. 7.5 min. quadrangle showing project location, and general vicinity.

Appendix 2: Photograph(s) of Survey Area, Historic/Prehistoric Sites.

Appendix 3: U.S. Forest Service Cultural Site Record forms (as necessary).

IF CULTURAL RESOURCE SITES OR ARTIFACTS ARE DISCOVERED DURING PROJECT WORK NOTIFY THE FOREST ARCHEOLOGIST IMMEDIATELY

District Forest Ranger Concurrence:

I concur with the above recommendations _____

I do not concur with the above recommendations _____(Return Report to Arch.)

I recommend the following cultural resource management action: _____

_____

_____

_____

File #: Canyon Creek

CULTURAL SITE RECORD

FIELD # (OPTIONAL): 1988-D2-7 STATE #: 24 BE 804
MAP: Vipond Park , 15 ', 1958 AERIAL PHOTO: available at District Office
COUNTY: Beaverhead CONTOUR:> 6000 ; < 6700 ;x 6500 feet + Msl
MERIDIAN: Montana Principle T 2 S , R 10 W , SE 1/4 of NW 1/4, Sec 8
U.T.M.G.: Zone ____; ____mE/____mN
LAT./LONG. (optional): ____° ____' ____"W Long/____° ____' ____"N Lat.
SITE LOCATION (give bearings and distances wherever possible): site is located approximately eight miles west of Melrose, MT. on Forest Road #187. Map reference: from Ore Camp Hill (Sec. 17) on an azimuth of 5 degrees for a straight line distance of 7,800 feet.

ACCESS: from Melrose, MT., drive four miles west on Forest Road #187 to the ruined town of Glendale, MT., and the junction with Forest Road #188, follow #187 to the right another four miles to the kilns
SITE DESCRIPTION (Be thorough, explicit and concise; this may be the only record ever made of this resource.): this historic site is the location of 23 brick, beehive-shaped charcoal kilns constructed by the Hecla Consolidated Mining Company in the early 1880's. They were used to burn cordwood to charcoal for use as a furnace fuel to reduce silver-lead ore in the Company smelter at Glendale, MT., four miles distant from the kilns. They average 23 to 26 feet in diameter, and between 17 and 19 feet high. Their capacity is between 25 and 35 cords of wood per burning. The kilns operated from the early 1880's to 1900 when the smelter they were supplying was shut down and dismantled. Associated with the kilns are the remains of a wooden log chute and platform on the ridge rising behind the kilns, and a log structure adjacent to the top of the chute--probably a habitation for company workers
SITE TYPE: historic Euro-American industrial mining site-charcoal kilns
DIMENSIONS: n.a. meters____-____x____meters____-____ (cf. plan)
ESTIMATED AREA: n.a. square meters. DESCRIBE THE METHOD USED TO DETERMINE SITE EXTENT AND BOUNDARIES: the site boundaries encompassing the kilns, chute, and log cabin are approximately 150 acres. Extent of the site was determined through map reference and field survey with compass and steel tape
DEPTH OF CULTURAL DEPOSIT: Maximum ____cm; Mean____cm. Unknown
DESCRIBE METHOD USED TO DETERMINE DEPTH: n.a.

BIOTIC SETTING (Life zones, communities and habitats): kilns and chute occupy valley floor and steep adjacent hillside; sagebrush-grassland habitat

Site #: 24 BE 804

COMMON ON-SITE VEGETATION: Big sage, Idaho fescue, bluebunch wheatgrass, scattered Douglas-fir, scattered juniper, willow brush in riparian zone

SURROUNDING VEGETATION: some Douglas-fir at lower elevations, lodgepole pine at higher elevations

LOCAL FAUNA: mule deer, elk, moose, mountain goats, black bear, a variety of raptors, trout in Canyon Creek

SOIL OF SITE: dark brown silty loam

ADJACENT SOIL: dark and light brown silty loam, alluvial silts and sands

CULTURAL GEOLOGY: n.a.

LANDFORM SETTING: narrow, steep-walled mountain valley

EXPOSURE TO SUN: easterly

EXPOSURE TO PREVAILING WIND: east/west

NEARBY WATER: Distance 35-40 meters; Direction south
Nature of water source Canyon Creek
SITE MODIFICATIONS (cultural or natural, including cuts, erosion, pothunting, construction, etc.): the site has been looted over the years by local people gathering bricks, scrap metal, etc. During WW II there was a scrap metal drive which impacted the kilns; many of the kilns have collapsed
PREVIOUS STUDY (Nature of work, date, investigator, reference): none

ARTIFACTS (Describe; note whether collected or left in situ): can dump on hillside below cabin contains a variety of hole-in-cap cans, glass shards, iron hoops, sheet metal, shoe or boot leather, fragments of glass bottles, what appears to be a metal watch fob, tobacco cans; in the area of the kilns there are remnants of wood chute, scraps of sheet metal, bolts; only watch fob, a few bottle fragments, and tobacco can collected--all other artifacts left in situ

Site #: 24 BE 804

FEATURES (Describe briefly; attach supplemental data as needed): see continuation sheet

CULTURE HISTORICAL INFERENCES: historic charcoal kilns: charcoal burners were probably Italian immigrants, woodcutters who supplied cordwood to the kilns were French, or French Canadian

APPARENT SIGNIFICANCE OF SITE: site highly significant for association with persons of local historic importance; for association with significant events in local/state history; as example of historic industrial mining technology
NATIONAL REGISTER STATUS: not yet listed or nominated; likely eligible
POTENTIAL IMPACTS TO SITE AND/OR ITS INTEGRITY: site may be undergoing some small amount of vandalism, subject to continued deterioration through weathering; will be subject to more visitation when interpreted as historic
COMMENTS: none site

OWNER (Name and address): Beaverhead National Forest

TENANT: none

PHOTOGRAPHS (Number b/w, color, chrome; subjects): 75 35mm black/white photos 15 35mm color prints, 12 35mm color slides

PHOTO REPOSITORY: Forest Archeologist, Beaverhead N.F., Supervisor's Office
PHOTO CATALOGUE Nos.: n.a.
SITE RECORDER(S): Mike Ryan, John Hamilton, Harriet McKnight
DATE: 1 November 1988 LIST OF APPENDED DOCUMENTS:

MAP SHOWING LOCATION---------->

CULTURAL SITE INVENTORY RECORD
CONTINUATION SHEET

FIELD #: 1988-D2-7-historic STATE #: 24 BE 804

ITEM # CONTINUED DATA

NOTE: seven pages of technical data relating to the construction of the kilns, cordwood chute, cordwood platform, and cabin were removed from the Clemson Field Project copies of this document. Sketch maps and scaled maps of the site were also not included. All are available from the author upon request.

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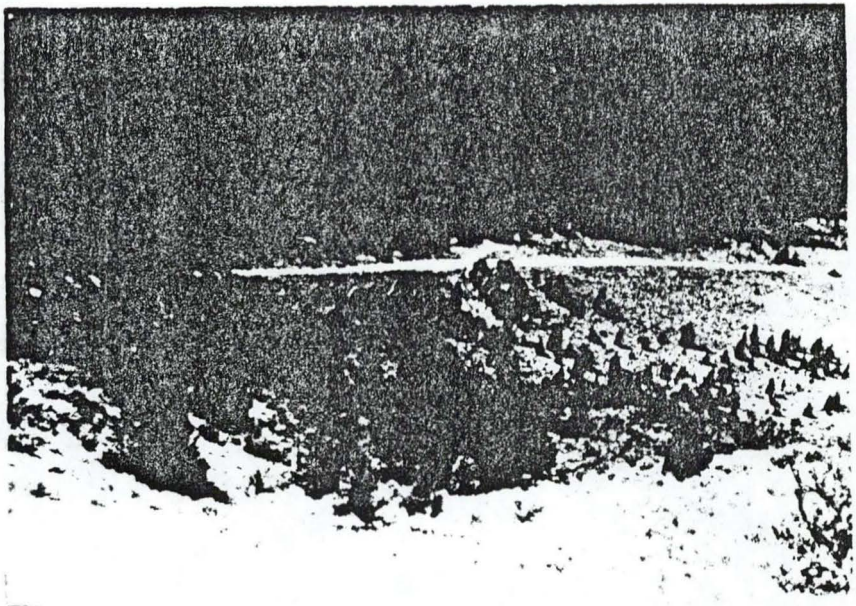
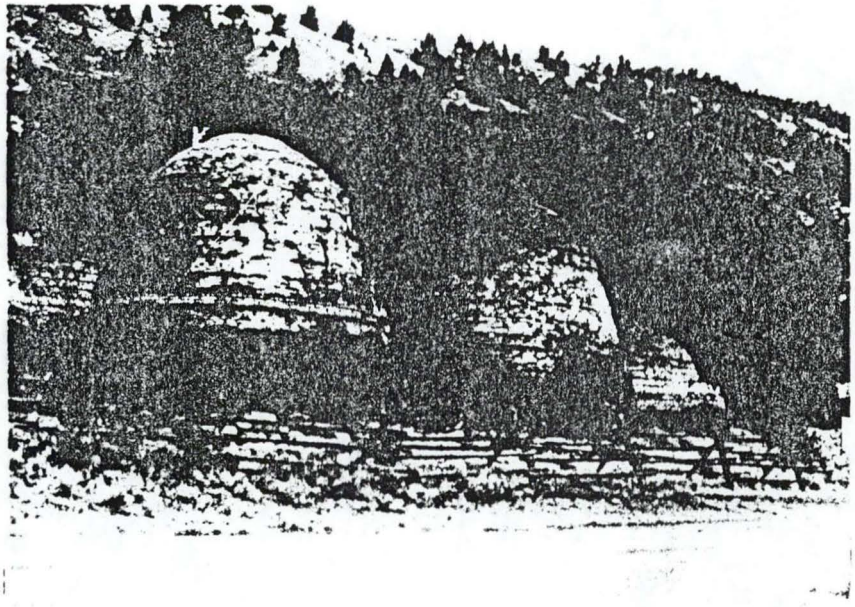
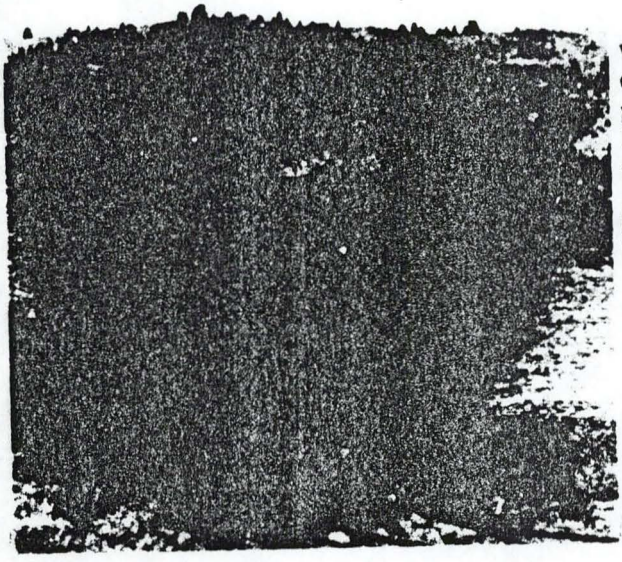


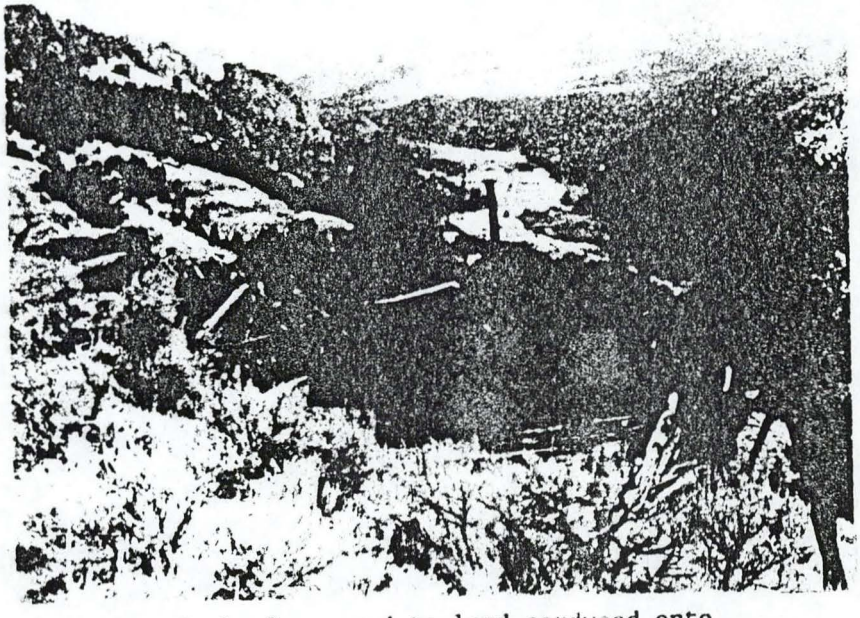
Overview of Canyon Creek Kilns.
Looking toward: south



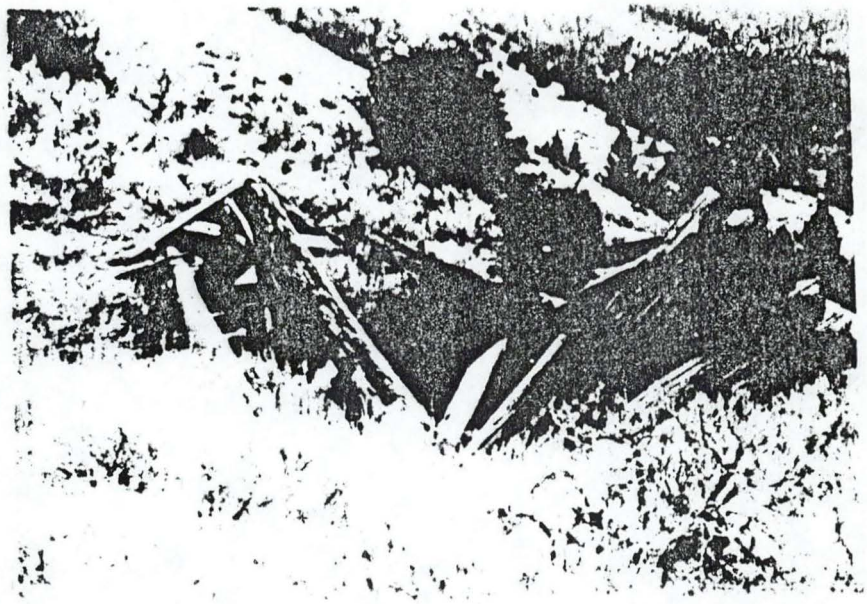
Closeup of Charcoal Kilns. Note vent holes
near [illegible]. White material is render which was
applied periodically for waterproofing.
Looking toward: northeast



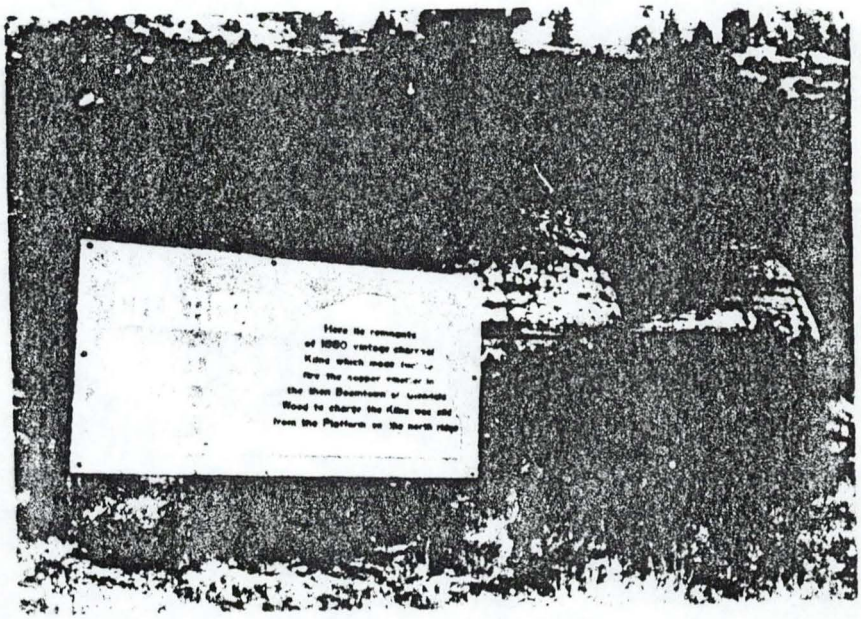
View of ridge behind Canyon Creek Charcoal Kilns. Note platform on ridgeline used to load cordwood onto chute for delivery to kilns. Note gully in center middleground which held wood chute. Looking Toward: north



Close-up of platform used to load cordwood onto chute for delivery to kilns. Timber in background is second growth. Historically all timber was removed from Canyon Creek area. Looking Toward: east



Ruins of cabin 30 meters east of loading platform. Used by workers tending load platform and cordwood chute. Extensive can dump immediately downslope with artifacts dating between 1890 and 1900. Looking Toward: east


Here lie remnants
of 1880 vintage charcoal
Kilns which made fuel
fire the copper reduction
the then Boomtown of Ironside
Wood to charge the Kilns was also
from the Platform on the north ridge

View of Carson Creek Charcoal Kilns from Canyon Creek Road showing present level of interpretation. Looking [illegible] north